

Radio Control **CAR ACTION**

THE WORLD'S LEADING R/C CAR MAGAZINE

47380

December 1994

Formula 1 Fun!



Join Parking
lot's PREMIER
CLASS p. 94

Team speed secrets of the EV10SS

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MRC's
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miya Pajero • Traxxas Nitro Buggy • OFNA Blazer SST

Whaddya
want for
XMAS?

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Formula for Fun?

So what's all this hoopla about Formula 1 cars and the parking lot racing scene? I must admit that, until recently, I had never really been a big fan of full-size F1 racing; I mean, the cars look pretty cool, but I thought F1 was mostly a European deal and that there weren't any F1 races here in the USA. I was always partial to Indy car racing. I kind of compared F1 racing to soccer, which is extremely popular in Europe but hasn't quite "arrived" here. Well, I was *wrong!* F1 races are held all over the world, even North America.

Anyway, I started to watch the races on ESPN, and I got hooked. I quickly found that F1 cars are the ultimate high-performance racing machines—they're totally sick! Did you know that these cars' 3500cc, overhead-cam, eight, 10, or 12-cylinder engines put out 675hp, go as fast as 210mph, and can also pull 4G! How about 0 to 60mph in 2 seconds and 0 to 100mph in 4.5—*yikes!* That's totally insane. I won't even get into details about the cars' active suspensions and engine telemetry systems.

Well, when F1 R/C cars started to show up here at the office, I soon found myself messing with *them* more than with any other type of car that came through our doors. What's really cool is that you can take one right out of the box, find a smooth parking lot and have a blast. If a couple of your buddies get them, too, you have the perfect formula for...you guessed it: *parking lot racing*. So check the F1 cars out. You can turn right to our F1 special section and catch F1 fever!

There's a ton of other hot features this month. Check out Chris's Christmas Wish List, the low-down on Joel "Magic" Johnson's race-winning EV10ss (speed secrets galore!) and—of course!—our in-depth Thrash Tests.

As if that isn't enough, our art director, Betty Nero, has done a fabulous job of giving the magazine an awesome new look.

All of us here at *Car Action* wish you a safe and happy holiday season. See you in '95! You won't believe what we've got planned!

John Howell

We want to hear from you!

Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chrisc@airage.com; John Howell (Doog)—johnh@airage.com; Karen Jeffcoat—karenj@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

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LETTERS

EXPERIENCE NEEDED?

I recently built a Tamiya Ford Escort RS 4WD car. I'm 13 and want to know if a lot of building experience is needed to build the Tamiya King Hauler. By the way, I love your magazine.

KEVIN WONG

West Vancouver, BC, Canada

Kevin, if you've built an Escort, you're well on your way. It isn't really harder to build a Hauler, but it's much more time-consuming. Instead of four tires, there are 10; instead of two gearboxes, there are two gearboxes and a three-speed transmission. The body is also more work, because it's plastic, and it must be painted from the outside and fitted with lots of chrome accents. I'd say that if you built an Escort, you can build a Hauler. Just don't expect it to be rolling as quickly.

John

GEARING UP

First of all, you have the best mag around. I just recently got an RC10, and I have a few questions. Is the 64-pitch gear better than the 48-pitch one that's in the Stealth? Are 64-pitch gears good for off-road? Will they strip easily? Are the black shocks better than the gold shocks?

MARK BALLOU

St. Petersburg, FL

Because 64-pitch gears have smaller teeth than 48-pitch gears, they're more fragile. They are, however, smoother and quieter. If you're running on-road, they're a good idea, but they probably

aren't the best choice for off-road. As for the shocks, the "black" shocks are hard-anodized and will last longer than the gold ones. They both work equally well, but after some time, the gold finish will begin to wear off, and then the aluminum body will wear out next.

John

APPLES AND ORANGES

Help! I'm planning to buy an R/C monster truck, but the one I want costs way too much. My second choice is the Kyosho USA-1. Is it as fast as an old-style (circa 1987) RC10? I want to be able to keep up with my friend's car. If not, what mods would I have to do? Also, how can I get my ideas for a new R/C listened to? I wrote to Tamiya; as of yet, no word. Keep printing a great mag!

CHRIS MARSH

Reidsville, NC

Chris, if you're trying to keep up with an RC10, you'll have a hard time with a USA-1. It's just in a totally different class. It would be like racing a Dodge K-car against a Ferrari. If you want to compete against an RC10, get one. As for getting your ideas heard...I'm listening.

John

GET DIRTY

My friends and I are writing in response to your "Get Dirty" article in the August '94 issue. We love your mag and the article, and we're hoping that we get to see more articles like that—maybe even a shootout! R/C Car Action is our only link to the R/C world, because we live in such a small community that the nearest R/C dealer is at least 50 miles away! We rely on your articles when we go to make a purchase. Thanks.

Also, we've noticed that off-road electric, which we all run, has been pushed to the side. We wanted to let you know that there are still off-road electric enthusiasts out here; try not to forget us! We're hoping to see a stock motor shootout and, possibly, a modified motor shootout. We appreciate the time you took to read our letter and would like to thank you also for

(continued on page 164)

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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Chris Chianelli: chrisc@airage.com.

John Huber: jhuber@airage.com.

Karen Jeffcoat: karenj@airage.com.

WHAT'S new

TRINITY Onyx Motor

The Onyx is the latest in the Speed Gems line of machine-wound motors and, like all the Speed Gems motors, it features the Epic EX-Tech technology. This 14-turn double is an excellent all-around motor that works well in most racing applications. Its features include 5.0 wet magnets, dual ball bearings and adjustable timing.

Part no.—9204; **price**—\$45.
Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705.



PROTOFORM Vortex L.D.

This 1993 Dirt Oval Nationals-winning body has great details; molded-in "vortex generators" for more efficient air flow; and add-on right-side and center air dams.

Part no.—1904; **price**—\$20.95.

Protoform, 5455 S. Western Blvd., Hamburg, NY 14075; (416) 646-7638.



RPM Bearings and Carriers for RC10GT and RC10T

These heavy-duty axle bearings and carriers can take the increased torque and side pressure generated by

today's modified RC10Ts and RC10GTs. The bearings are shielded stainless steel and have three times the load rating of 3/8-

inch-diameter bearings! The molded white, dyeable carriers are designed to lower the CG and eliminate almost all telescoping of the dogbones and universals.

Part no.—7023;
price—\$29.95/set.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366.

WINGS WEST Deep Cycler 5000

This new product will dramatically extend the life of your AAA to 1.5V Ni-Cds. It slowly steps down the Ni-Cd, then "jolts" it and applies a precision



stand-off or deep-cycle circuit. This eliminates the memory effect and restores your battery to its original capacity. It's easy to use: just connect the leads to your battery (red to positive, black to negative), turn the switch to "on" and walk away. Best of all, it uses only the power in your battery for deep cycling (no outside power is needed).

Part no.—DC-5000;
price—\$79.95.

Wings West, 7166 Crown Point Rd., Coos Bay, OR 97420; (503) 888-2849.



ESP Aluminum Servo-Saver

Replace your stock Clod Buster servo-saver with ESP's new heavy-duty, spring-loaded unit. It comes with bronze bushings and all the necessary hardware.

Part no.—ESP038.

ESP Hobby Mfg., 6215 Lou Ave., Unit C, Crystal Lake, IL 60014; (815) 455-5440.

TRAXXAS SRT

Traxxas' all-new racing truck is the first to have a no-breakage guarantee on its suspension parts: if they break, Traxxas will replace them—free! The truck's features include Traxxas' Zero-Flex, dual-plane composite chassis; large-capacity, hard-anodized, Teflon-coated, big-bore shocks; Pro-Line XTR tires; 272 Magnum tranny; 16 ball bearings; and hex-drive hardware.

Part no.—2503; **price**—\$335.

Traxxas Corp., 12150 Shiloh Rd. #120, Dallas, TX 75228; (214) 613-3300.





TOOL RESOURCE Desoldering Pumps

To remove solder quickly and safely, try these two new desoldering pumps. Model S601CD is for use on static-sensitive materials; model S501AS (not pictured) is an anti-



static pump. Both provide instant vacuum action, and each pump has a heat-resistant plastic body and a self-cleaning, conductive Teflon tip.

Part nos.—S601CD, S501AS;
prices—\$17.99, \$14.99.

The Tool Resource, P.O. Box 1106, W. Dundee, IL 60118; (708) 468-0849.

PARMA BMW Body

This BMW 325i body is Parma/PSE's newest. When you race it on your Tamiya 4WD saloon car, its incredible detail and realism will turn heads.

Part no.—10384; **price**—\$19.

Parma International/PSE, 13927 Progress Pkwy., North Royalton, OH 44133; (216) 237-8650.



Q-WELD Q-Weld Repair Putty

Repair steel, aluminum, chrome, plastic, glass and



wood with Q-Weld. It sets in 5 minutes and stays set—even when exposed to moisture. It comes in a resealable container and can be sanded, sawed, drilled, tapped, machined and painted! The epoxy and hardener are combined in one stick, but they won't harden until they have been cut and kneaded together. Q-Weld can be mixed by hand and washes off with soap and water.

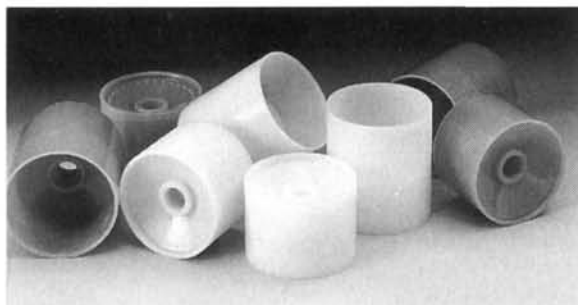
Price—\$2.95/2-ounce container.
Q-Weld Co., 5320 W. 16th St., Ste. 349, Indianapolis, IN 46224; (800) 995-4314.

WINDWARD PRODUCTS Portable Hobby Meter

This light, compact meter will help you to determine the condition of your receiver battery pack. It puts a 37-ohm load on the battery being tested, and the display shows the current that's provided by the battery. (A strong receiver pack will show a 129mA reading.) The WP2000 can also test diodes and measure AC and DC voltage, resistance and DC current to 200mA.

Part no.—
WP2000;
price—
\$29.95.

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Distributors,
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(217) 355-0022.



PARAGON Fluorescent Rims

Paragon's popular Centerline rims are now available in vibrant fluorescent colors: Hot Pink, Fire Orange and Saturn Yellow. Outshine the competition! Each set includes two front and two rear rims.

Part nos.—HP014 (pink), FO014 (orange), SY014 (yellow);
price—\$7.50/set of four.

Paragon Racing Products, 340 Industrial Blvd., Waconia, MN 55387;
(612) 442-6364.



TAMIYA F1 Hop-Ups & Replacement Parts

Tamiya's 1/10-scale F1 car class is becoming one of the most popular racing classes in the nation, and demand for parts has never been greater. Tamiya has responded with a comprehensive line of F1-specific hop-ups and replacement parts that ranges from the basics (suspension arms and diff sets) to high-tech options, such as one-piece ball thrust bearings and high-capacity shocks. Twelve tire options and 15 body sets are also available.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656; (714) 362-2240.

READERS' rides



IRON RIDE

Ivan the Ironman only wishes his Toyota was as sano-looking as this truck. Steve Pannulla, who hails from Coram, NY, sent us this photo of his 1/8-scale Mugen Toyota pickup. Steve's truck is powered by a Rex three-port Super Competition buggy engine. An Airtronics XL2P radio controls the truck; a high-speed servo controls the throttle; and a high-torque servo controls the steering. It looks pretty sharp, Steve; now get out there and get that thing dirty!



CHEAP STREET

Spotting a bargain he couldn't resist, Dan Baraszu of Plymouth, MI, bought this Tamiya Subaru Brat for 50 bucks and then added some other sale items. The results? As you can see, Dan now has a cool-looking street ride for a reasonable price. Dan's pavement pounder is equipped with a complete set of bearings, CRP front shocks and rear stabilizer, a Trinity Monster Horsepower motor, Blackfoot rear rims and slick tires and a Bolink Ford "Vickie" body.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 1-year subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the sixth annual "Reader's Ride of the Year Contest" in January 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



TAKIN' NITRO TO THE GRAVE

The list of mods that Marvin "Butch" Jones made to his Kyosho USA Nitro Crusher goes on and on. Marvin, who resides in Renton, WA, sent us this picture of his tricked-out truck as well as his mod list that includes hop-ups such as a Parma Grave Digger body, an O.S. RX-B .21 engine, full ball bearings throughout, eight gold shocks, a DuraTrax tuned pipe and V-spike tires, front and rear stabilizers and a quick-fill fuel tank. The truck is controlled by a Futaba Magnum Junior radio, and a 9303 servo handles the steering chores while a 9301 takes care of the throttle/brake duties.



ALAN'S ARMY

Does this guy like trucks or what?! Alan Boyce of Surrey, England, sent us this photo of his fleet of 32 trucks. There are several Clod Busters (in various stages of modification), a couple of Bull Heads, a Big Brute, a Monster Vette, a Double Dare, a Nitro Thrasher, a USA-1, a few Heavy Metal Monster Tanks...the list goes on and on. Man, with 32 trucks, it probably takes Alan half an hour to figure out which radio goes with which truck!

READERS' rides



A TRIBUTE

Leon Montfrooy of the Netherlands made this car as a tribute to the late Ayrton Senna—one of the most famous F1 drivers in the world. Leon's Tamiya McLaren Honda has been modified with a Sauber rear wing, and it's equipped with a Futaba receiver and a Hitec speed control. Leon adds, "I haven't driven it yet. It just looks too good." Well, Leon, we have to agree with you there. It's definitely a fitting tribute to an excellent racer.

THE FIRST ONE...SO FAR

John Meroth of Tampa, FL, sent us this photo of his son Tony's modified RC10GT. It's diesel-powered and probably the first of its kind. John contacted his friend Bob Davis of Davis Model Products, who produces diesel conversions for glow engines. John convinced Bob to produce a kit for his .12 O.S. CZ-R and, according to John, the truck rips! After some minor clutch mods, John tried the new MIP clutch setup for the truck—the perfect addition to get the power to the ground properly. John informs us that the diesel-powered .12 CZ-R can put a major whuppin' on all .12 glow-powered engines. It sounds like a 4-stroke motorcycle, and it can literally smoke the tires on asphalt!



HOPPED-UP HOG

Christian Danner of Voerde, Germany, sent us this picture of his souped-up Tamiya Toyota Bruiser. Christian's truck is controlled by a 7-channel radio, which operates the throttle, the steering, the three-speed transmission and the working light bar, taillights, headlights and turn lights.

Power is provided to the Tekin 610R speed control by an 8-cell, 4400mAh Sanyo pack. Other features include 1/16-scale, chromed exhaust stacks; a handmade hood scoop; an aluminum bedliner and rollbar; complete ball bearings; and each wheel has an extra damper and a leaf spring. Christian also made a custom aluminum trailer hitch for his scratch-built, 50-inch-long, three-axle trailer that totes around his highly modified Kyosho USA-1.



DOG-DAY AFTERNOON

What the heck is going on here? Steve Roach of Ft. Wayne, IN, has an RC10T that he modified with a graphite chassis and shock towers, a Tekin 420 G2 speed control, MIP steering, CVDs and Golden shock shafts. It also has Tecnacraft 6-40 turnbuckles, RPM rod ends, a Trinity Ex-Tech 11-turn motor and a Futaba 9303 servo. But forget the mods...what about the dog? I sure wouldn't want to fall short on a jump and hit Fido here; he looks mean!



ALOHA-SI

Travis Fukumitsu of Honolulu, HI, sent us some photos of his Losi Double-X buggy. Travis's car is equipped with a Twister modified motor, a Novak 410-M1c speed control, a Futaba S132 steering servo, Tecnacraft titanium turnbuckles, MIP CVD drive shafts and a pack of Trinity 1700 SCRC cells. The body was painted and photographed by his friend Aaron Chock. Nice job!

In search of fun
and glory, cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



Stadium STUD



Whether or not you like the styling of the '95 Dodge Ram, you have to admit it's daring. Well, you don't have to admit it; but if you don't, you're wrong! Anyway, Pro-Line's new 1/10-scale version, which looks very hot (in my opinion) is vacuum-formed out of crystal-clear Lexan and includes a molded rear wing. It's currently available for both the RC10T and RC10GT (gas truck). If you look really closely at the photo, this truck is equipped with Pro-95 "Edge" front tires—Pro-Line's latest front truck tire. Mark Pavidis TQ'd in Modified at the ROAR Nationals with these tires. They were also used to TQ and win the Stock A-Main. Find out why they're called "The Edge" in next month's "Inside Scoop."

Associating with winners

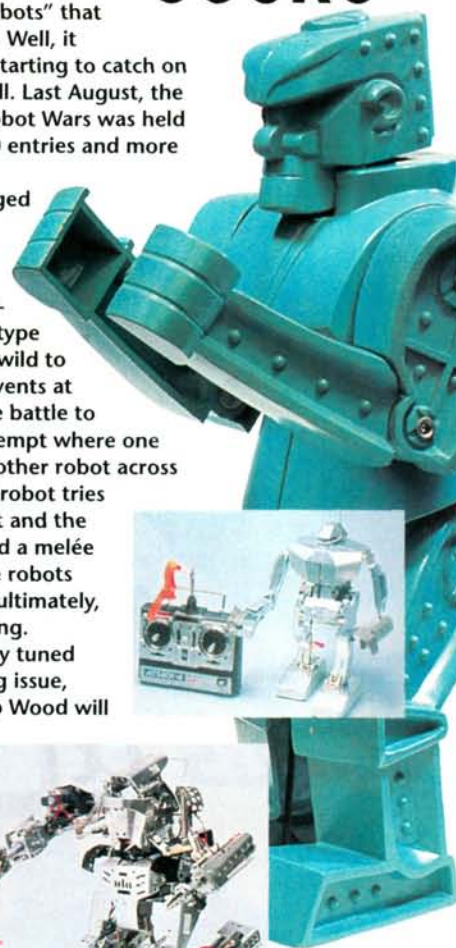
So. Cal. Raceway, CA—'94 ROAR Truck National Championship. Team Associated's winning reputation is once again reinforced by having five RC10T trucks in the Stock A-Main and seven in the Modified A-Main. Now that's what I call a strong presence!

The gorgeous Renee Carrol—Miss So. Cal. Raceway—poses with Mark Pavidis (right), who was Top Qualifier in both the Stock and Modified class and Barry Baker, who was second in Stock. Mark also won the first A-Main in Modified and was leading in the second A-Main by 3 seconds when his motor stopped for some reason, giving the heat to Brian Kinwald's Losi Double-XT. Brian went on to win the Modified truck title.



ROBOT JOCKS

Remember Rock 'Em Sock 'Em Robots (right), where you'd try to smash your opponents head off? Well, this is even better. Every once in a while, our Japanese friends over at RCM magazine do a story on these killer radio-controlled robot wars they have. They have an absolute blast doing it. Shown below are a few of the "battle bots" that participate in the event. Well, it seems as if it might be starting to catch on here in the States as well. Last August, the 1st International R/C Robot Wars was held in San Francisco with 20 entries and more than 1,000 spectators. Anyway, the robots ranged from a weird-looking, armored-car lookalike equipped with a CO2 ramming device to tank-tread-powered, assault-type vehicles. Sounds pretty wild to me. There were three events at the "war": a one-on-one battle to the death; an escort attempt where one robot tried to escort another robot across the arena, while a third robot tries to disable the first robot and the one it was escorting; and a melée free-for-all where all the robots entered the arena and, ultimately, only one was left standing. Interested yet? Well, stay tuned because, in an upcoming issue, contributing author Rob Wood will bring you this wild story about how the frequency fighters disarmed one another.



Here's a peek at Kysoho's new 4WD, GS .11X-powered, shaft-drive, BMW M3 GTR. The M3 comes with differentials, a tank, a pull-start, an engine and a disk-brake/center-diff assembly mounted to the blue alumite Duraluminum chassis. Other features include: oil-filled plastic shocks; wear-resistant, heavy-duty FRP disk brakes and a two-speed automatic tranny. A full report is coming soon; stay tuned.

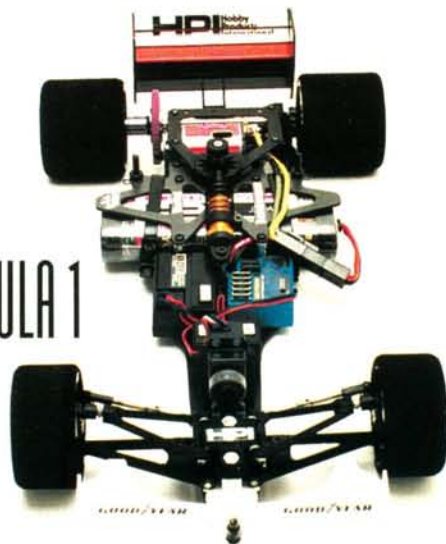
Bavarian Blitz



It seems that with the increasing popularity of F1 racing, more and more after-market companies are starting to produce hop-up items

HPI'S SUPER FORMULA 1

for these trick street sweepers. HPI is well-known for its crazy and innovative F1 machinery (check out the "F1 Fever" section for a peek at some of their products), and now they're entering the market with their own complete F1 car. The HPI F1 kit comes with a graphite chassis, adjustable turnbuckles and a double-wishbone front suspension. It features adjustable camber and caster, a three-pivot ball suspension without a T-bar, 64-pitch pinion and spur gears, and HPI's all-new, five-spoke, on-road Super Star wheels. For more info on this road missile, contact HPI at (714) 837-3251.



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From Magic Motor Sports

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&
off



The eyes of the full-scale F1 racing world are focused on Gerhard Berger, Jean Alesi and Ferrari's new 412T1; what a combination! Tamiya's 1/10-scale replica of the new Italian roadrocket is getting the same attention in the model racing world. It's all there in 1/10 scale—the distinctive raised nose, the adjustable tri-deck rear wing and the unique wraparound front wing—and look at those beautiful golden mesh wheels! Add all this to already proven Tamiya F1 performance features like double-deck F-103 chassis and triple-disk friction dampening, and you've got one super-desirable, open-wheel road warrior.

Who says only Ferrari can have golden wheels!? Tamiya's new Jeep Wrangler Hard Top Limited looks very cool with them, too! The hard ABS-injected body makes super scale features possible. With smoke-tinted windows, scale Goodyear Wrangler tires and the optional functioning light set; this vehicle is mantelpiece show quality. With full-time 4WD, metal-gear differentials, independent front suspension and four-link, rigid-axle rear suspension; this model is show and go. Watch for future reviews on both of these fine kits.



Not only will Pro-Line's new Jaco Mount & Glue Caps make your Tamiya or Kyosho F1 or Indy car more realistic, but it will also provide improved traction on concrete and other dubious surfaces. These long-wearing caps need only be glued with Zap at the wraparound edges for quick, accurate mounting. Also shown are Pro-Line's new, ready-to-mount Jaco Trued Donuts, which are available in pink, purple and white foam compounds. According to Pro-Line, the purple and pink compounds are excellent for parking lot asphalt, and the white is great for carpet. For more info, contact: Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

GET A GRIP.

Gettin' sideways is cool if you're running dirt oval, but if you're racing on carpet or asphalt, it doesn't cut it!

To improve foam tire performance on hard surface tracks, the race team worked with the chemical engineers at Trinity to develop Zip Grip™, a custom, hand blended R/C foam tire traction compound.

Using Zip Grip provides the most precise and repeatable tire performance on carpet or asphalt R/C racing tracks, of any formula available today. And, the new style applicator keeps the Zip Grip on your tires and off your hands.

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In the July issue, I published some spy shots of MRC's 1/10-scale MT-Series trucks: the MT-10S (stadium truck) and the MT-10M (monster truck). Both are based on the same chassis; here's a close-up look at the chassis and some of its features.



A closer look at MRC'S NEW TRUCKS

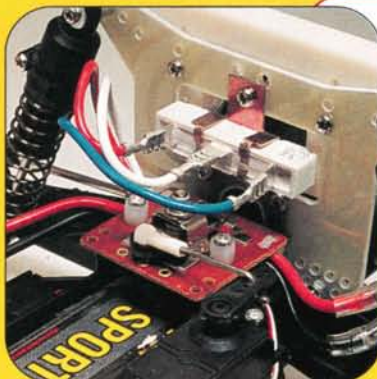


The chassis and wide-track suspension arms are made of what MRC calls "non-flex composite resin." The quick-change battery box is fitted with a retainer bar secured with a metal clip. Note the adjustable suspension upper links all around.



Oil-damped composite-resin shocks have multi-mounting positions on the top and bottom. Coil-over spring collars provide infinite spring-tension adjustments. Note the multi-position, upper-link mounting holes.

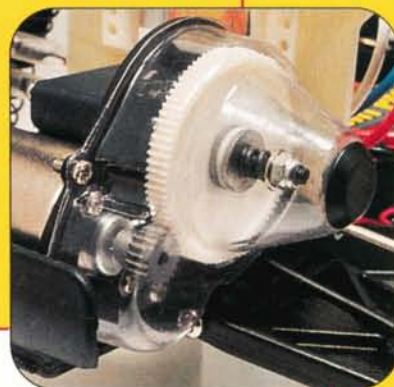
For more information, contact:
Model Rectifier Corp., 200 Carter Dr., Edison, NJ 08817; (908) 248-0730.



The kit includes a stepped-resistor, mechanical speed controller. Note the multi-position, upper-link mounting holes for the rear suspension.



The ball-link steering-arm end, the bellcrank linkage and 30 degrees of caster rake improve stability, limit slop and eliminate bump-steer.

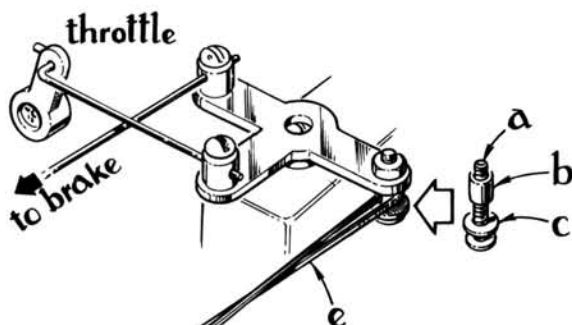


The transmission features a ball differential, a 48-pitch spur-and-pinion gear, a slipper clutch and fine-mesh internal gears. The 540 motor is included in the kit.



PIT TIPS

by Jim Newman



FAIL-SAFE THROTTLE

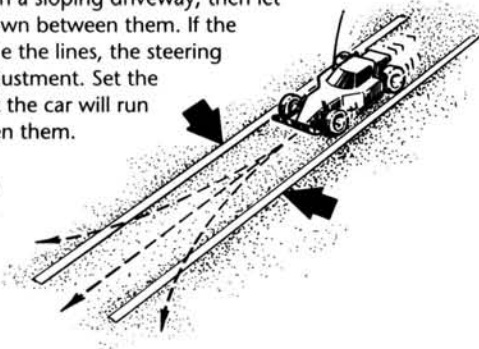
If the Ni-Cds fail, the throttle is pulled closed by a rubber band. A screw (a), a piece of tubing (b) to protect the rubber band from the sharp threads and a washer (c) are attached to one end of the servo arm, while the rubber band (e)—just strong enough to pull the throttle back—is hooked around a suitable screw on the chassis. Note: the pull of the rubber band is going to be a slight drain on the Ni-Cds, so check them.

Joey Bernal, Lomita, CA

STEERING-ALIGNMENT CHECK

Draw two parallel chalk lines, or lay two lines of masking tape on a sloping driveway; then let your car run down between them. If the car veers outside the lines, the steering needs some adjustment. Set the steering so that the car will run straight between them.

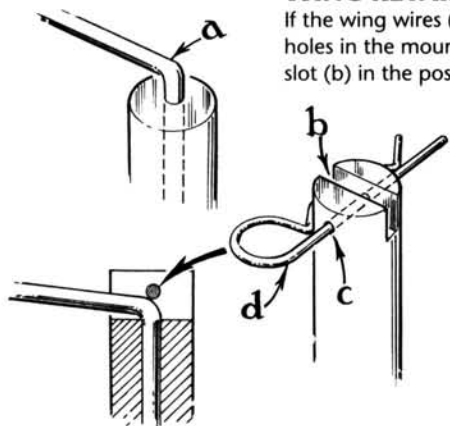
David Evans,
Covington, KY



WING RETAINER

If the wing wires (a) pop out of the holes in the mounting posts, saw a slot (b) in the post and cross-drill a hole (c) that's big enough for a body clip (d). This will keep the wing wires in place, yet they'll be easy to remove.

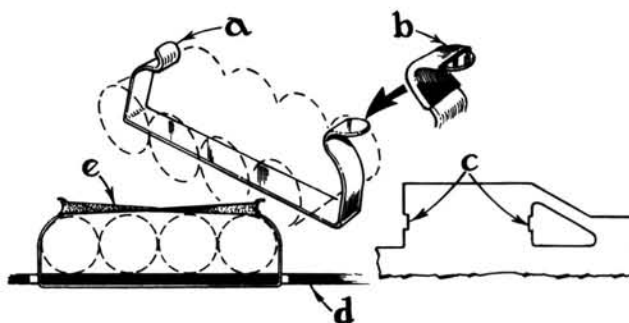
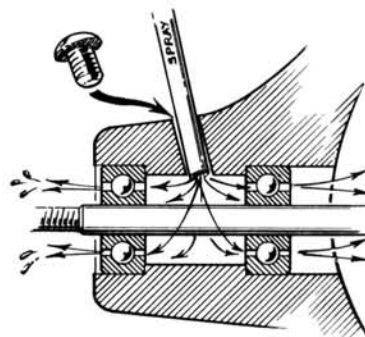
Bruce Gray,
Kittanning, PA



EASY-FLUSH REAR BEARINGS

With the rear bearings removed, drill a $\frac{3}{8}$ -inch (2mm) hole in the bearing housing between the two bearings, as shown. To clean the bearings, insert the nozzle of a motor-spray can into the hole and blast the dirt outward. Allow the bearings to dry, then put several drops of oil into the hole. Use a suitable screw as a plug, and take care not to screw it in so far that it binds up the axle.

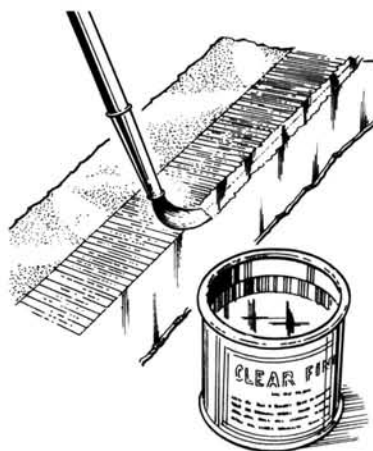
Michael Graves, Jackson, MS



QUICK-RELEASE BATTERIES

Bend a brass strip from the hobby store as shown (a), with a piece of heat-shrink sleeve (b) around the ends to protect the rubber bands. Cut shallow locating notches (c) in the battery platform, push the strip up through the chassis (d), then wrap rubber bands (e) over the cells.

Paul Kostura Jr., Fountain Hills, AZ



NO-LEAK MASKING

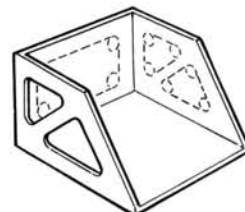
After masking, but before applying the next color, run a little clear finish over the edge of the tape, or spray a couple of coats over everything, and let it dry. This clear finish will seal the edges of the tape and prevent the next color from bleeding under it.

Dan Meredith, Lake
Oswego, OR

LIGHTWEIGHT BATTERY CUPS

This is one method of cutting lightening holes in your battery cups. Drill $\frac{3}{16}$ -inch (5mm) holes in the corners, then join the holes with cuts.

Austin Henderson,
Mt. Juliet, TN





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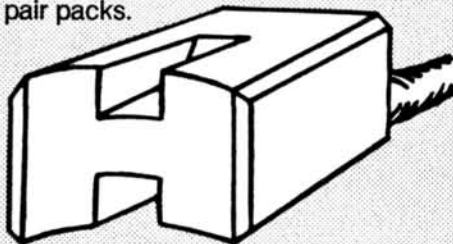
"My buggy has too much power, I can't control it!"

"The Powerzone Comm. Drops are the best. I swear by em."

"I love my Purple Haze Motor. I'm goin' out and gettin' two more right now!!"

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"H" Cut Lay Down "R" Brushes Team Race Prep has tested hundreds of different types of cuts for Lay Down type stock motors and one out performs the rest by a mile. The "H" Cut Lay Down Brush is molded using the famous Silver "R" Compound material. Expect gains of 1000 RPMs and up within the working range of any type of stock motor. Available with or without screw eyelet in 1 or 5 pair packs.



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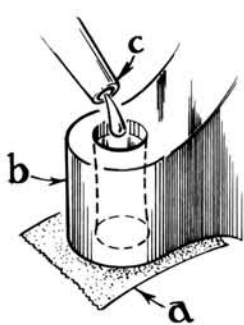
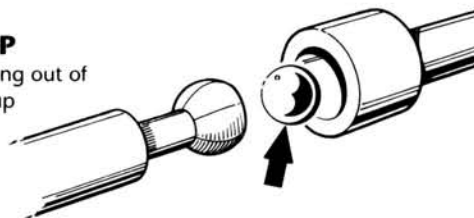


PIT TIPS

MONSTER BEETLE SHAFT SLIP

Stop your Beetle short shafts from slipping out of the differential by placing a BB in the cup between the long shaft and the half shaft. This will take up the "play" and prevent the shafts from backing out of the cup.

Chris Kelley, Omaha, NE



WORN-HOLE FIX

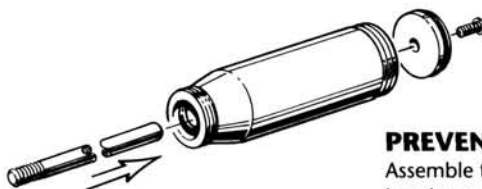
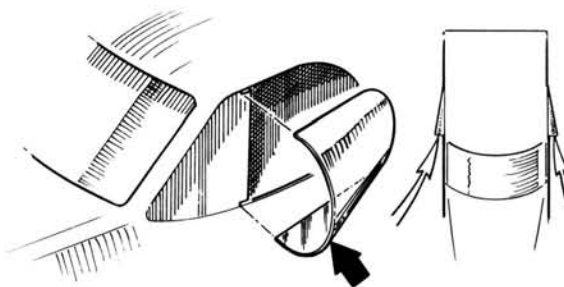
Put a patch of tape (a) over the bottom of the hole in the hub carrier or steering block (b), then fill the hole with CA (c). When the glue has hardened, use the appropriate drill bit to drill out the hole to fit the pivot pin.

Joe Howell, East Aurora, NY

SIDE WINDOW AIR SCOOPS

Cut out part of the side windows as shown, bend a scoop made of clear Lexan to fit in the opening, then glue it into place. This will direct air over the speed control.

Sunny Lo, Calgary, Alberta, Canada



PREVENTING O-RING DAMAGE

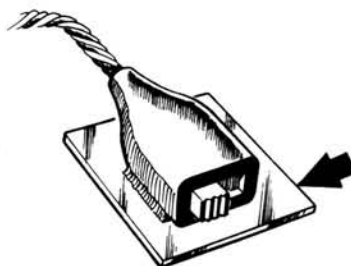
Assemble the shocks by oiling the shaft and inserting the non-threaded end through the bottom of the shock body. This keeps the sharp threads away from the delicate rubber O-rings and prevents them from being cut and causing leaks.

Ryan Hanlon, Dallas, TX

BETTER ESC SWITCH ATTACHMENT

Glue the ESC switch to a square of Lexan so that there's a much larger area for the double-sided adhesive tape to stick to. Now the switch will stay firmly attached; yet it can be easily removed for maintenance.

Romeo Collado, Mililani, HI





TROUBLE SHOOTING

by John Huber

Wham Bam Slam

About a year ago, I bought a Hawk R/C truck (used), and it has two problems. One is that the back shocks have zero resistance. If I get at least one foot of air, my back end slams down, making an annoying banging sound. Is it the oil or the springs? The second problem is that my transmission makes too much noise. Can you help me, please?

JOEL GAMEZ
San Dimas, CA

Joel, it sounds as if your shock oil is too light or has leaked out. Remove the shocks and open them up. Clean them with motor spray, and refill them with a good-quality shock oil. Start with 30WT oil, and see how well it works. If your truck still bounces, try a heavier oil. As for the noisy gearbox, check your gears. Noise can be a sign that the gears are worn or that the mesh between the pinion and spur gear is too tight.



Fry me baby!

I recently bought a Losi Junior T. It wasn't very fast until I broke it in. Soon after that, the outdrive gears started to slip. I found that the right outdrive gear, the male diff half and the center diff gear were all partially stripped, so I rebuilt the transmission with new parts. When I run the Junior T now, the motor gets hot after a minute or so. I have a Magnum Jr. radio; a Novak 610 RV speed controller; a Tony Neisinger signature modified motor; a 48-pitch, 86-tooth spur gear; and a 25-tooth pinion gear. Please help me before I use it to cook eggs.

GEORGE FRAZIER
Waldorf, MD

A hot motor is usually a sign that the pinion gear is too big, George. It could also be a sign of a binding transmission. First, remove the pinion gear, and spin the tranny by hand. It should spin freely, and the tires should turn easily. If not, check the condition of the bearings or bushings in the gearbox. If everything checks out there, try running a smaller pinion gear (say, a 20-tooth). With a good battery, your run time should be about four minutes. If it's less than that, your truck is probably still over-gear.

Outta Control

I have an Associated RC10 Worlds car. I'm running it with an Airtronics XL2P, a Novak 410 M1c, a Novak NER X2 receiver, an Airtronics high-speed servo and Trinity Pro 1700 SCRC racing cells. When I race the car at the track, it runs well, but when I'm at home, it runs wildly when I just turn it on. I mounted the receiver in the car, and I have an external Shottky diode on the motor. I'm thinking about getting a Novak stutter stopper, but the guys at my local hobby shop say I don't need it.

JAMES WARD
Merced, CA

James, if everything works perfectly at the track, but not at home, you have interference problems. It sounds as if, near your home, there's something whose transmissions are affecting your receiver. My first suggestion is that you try

another set of crystals on a different channel. If you still get interference, you might have to try another band entirely. If it happens on your 27MHz set, try it with a 75MHz set. If you still have interference, consider moving!



One-wheel drive

I've had a Midnight Pumpkin for three years, and I've done all the work on it myself. Recently, I've had difficulty operating it. When I set it on the street, the motor starts, and the truck moves in slow motion. When the motor is running, only one rear wheel will turn. I disassembled the truck and inspected the motor and gears, and everything looked fine. I checked the



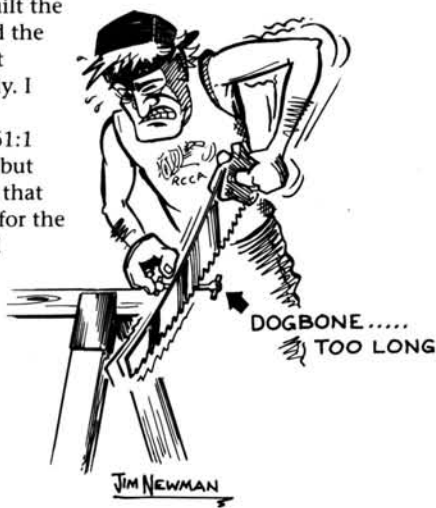
pins that run through the rear axle, and they looked fine, too. Recently, I snapped the green wire from my motor and re-attached it with Krazy Glue. The Pumpkin worked well for a couple

of days, but then the problem started. Would a bad contact cause it to run sluggishly or not run at all? If it's not the contact, what might it be?
LUKE STANZIANI
Lake City, FL

Krazy Glue is good for some things, Luke, but it isn't a good electrical conductor. In fact, I think it could be called an insulator. If your motor even runs, I'm surprised. My first suggestion is that you remove all the Krazy Glue and re-solder the wire to the motor. You might have to snip off a little of the wire to get the solder to stick again. With the wires connected properly, you should get full power to both wheels.

Dem bones... dem bones... dem Dogbones

About a year ago, I bought a Losi Junior T. I have a Futaba Magnum Sport radio with an M210CB ESC. Before I even built the kit, I knew I was going to upgrade. I built the kit stock, and the tranny didn't work correctly. I built a Losi Double-X 2.61:1 ratio tranny, but then I found that it's designed for the LX-T kit, and so the dogbones were too long. I think I can buy either MIP CVDs or LX-T rear arms, but I don't know whether they will work. Please help! I've had this thing for a year, and it hasn't run once. All my friends are stumped, and my local hobby shops have been no help.
PHIL KELLER
Ellicott City, MD



Phil, I called Losi on this one to see exactly what your options are. The simplest cure is to replace the LX-T dogbones with a set from the SE buggy. Losi will swap them for you if you send yours back with an explanation. The CVD drive shafts are

an option, but you'll have to buy those. If you add LX-T arms, you'll also have to swap the rims. The rims are offset so much that they just won't work with LX-T arms. Return the bones to Losi and start running that truck!

Escort service

I own a Tamiya Ford Escort RS 4WD Rally Car, and I have two problems with it. The first is that the large heat sink on my DuraTrax DTX-4 speed control comes off whenever I hit a bump or take a jump. My other problem is that, at low and high speeds, I need about 15 feet to turn because the car's turns are so wide. I've tried adjusting the trim on my transmitter and everything. What's the problem? (I use a Futaba S-148 servo.)
KEVIN WONG
Vancouver, B.C., Canada



Kevin, to fix your heat sink, simply bend one of the end tabs slightly so that you'll be able to clamp it onto the FETs more securely. Bend the tab by pressing the heat sink against a hard surface. It should be difficult to put on, but at least it won't fall off. As far as the steering goes, make sure you're getting full travel. Turn the steering wheel fully in one direction, and note how far the wheels turn. Now remove the servo horn from the servo, and see how far the wheels turn

before they hit resistance. If they turn farther with the servo horn removed, you can get more response from the car. First, move the steering link that's on the servo horn to a hole that's farther from the center screw; this will increase the front wheels' travel. You can achieve more throw by moving the link out even farther. Also make sure that your radio's dual-rate dial (if it has one) is adjusted for maximum throw.



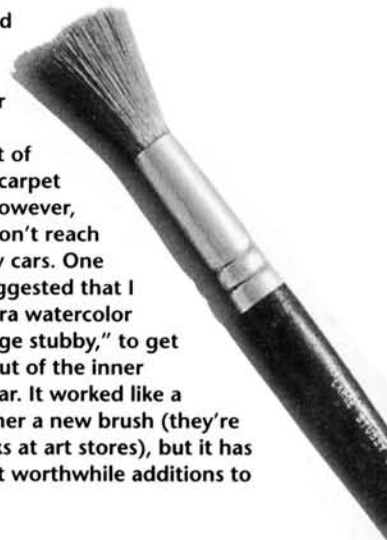
More tricks from the Doctor's black bag

EVERY TIME I go to the track or just hang out with my R/C friends, I learn new ways to do things that make me sit back and say, "Why didn't I think of that?" That's when I whip out a piece of scratch paper and write down what I've heard so that I can try it out

myself—and pass it along to you if it works!

Here are a couple of neat things that I'd like to tell you about. All have been tested in my secret laboratory, and they all work. They'll save you time, money, aggravation and simply make your R/C life easier!

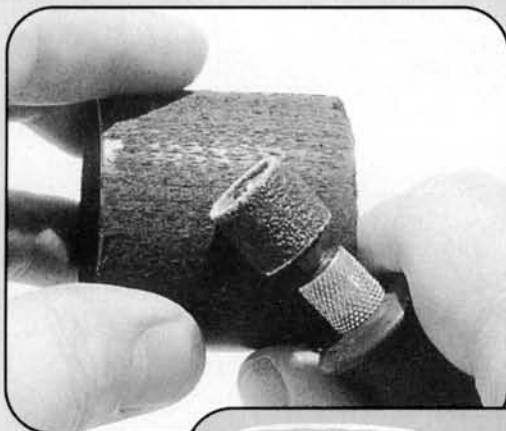
For years, I've used a soft, 2-inch paintbrush to clean my on-road cars after each heat. It's pretty good at getting most of the rubber dust and carpet hair off. Inevitably, however, that big brush just won't reach some places on many cars. One day, my daughter suggested that I try one of her tempera watercolor brushes, called a "large stubby," to get that nasty old stuff out of the inner recesses of my oval car. It worked like a charm! I had to buy her a new brush (they're only a couple of bucks at art stores), but it has been one of the most worthwhile additions to my toolbox in years!



Remember the three rules for mounting foam tires:

1. Rough up the rim.

If you don't rough up the shiny finish on plastic and nylon rims, the cement will peel off in a hard turn—and so will your donut! You can use regular sandpaper, but I've found that the best method is to use a sanding drum on a rotary grinder. Before you glue on the new donut, wash the rim with soap and water and let it dry.



2. Cure the cement.

A lot of folks just brush on contact cement and slap the rim and the donut together. That's fine for one night of racing, but if you want your tires to last a long time—until they're so thin that they look like paint on the rim—you have to do a better job. Put a nice, even coat of contact cement on the rim and the inside of the donut. (Buy contact cement by the quart—it's only about \$5—and transfer it to a smaller bottle.) Let them sit for 15 minutes—no more and no less. Dip both in a jar of lacquer thinner (extensive testing has shown a pickle jar to be optimum because of its large mouth), and use a tire horn to ease the donut over the rim. You'll have 2 or 3 minutes to seat the donut on the rim. To remove glue smears from the sidewalls, use a paper towel dipped in thinner. Before you true the finished assemblies or use them on your car, let them set overnight.



3. Seal the suckers up.

Keep your mounted tires in resealable bags or, better yet, in plastic containers that have lids. That way, they won't dry out. Dried-out foam wears much faster and provides less traction than foam that's kept in a sealed container; that's why foam donuts come in plastic bags. Don't open the bags until you're ready to mount the donuts.



Plastic containers that have lids make great storage boxes for tools, lubes and the other things that you take to the track. I use one for my general tools, another as a catchall for the voltmeter, calculator, discharge bulbs (keeps 'em from breaking!), spare spur and pinion gears, lubes, etc., and another one for tires. I have yet to find one that's good for

motors and batteries, but most hobby shops carry yellow nylon boxes with attached lids that do the trick. I've also discovered that floss boxes from arts and crafts stores work really well for storing small parts, such as nuts, bolts, washers and E-clips. They have lots of small compartments and

are available in several sizes. To prevent the box from coming apart in your track bag, make sure that you put a rubber band around it!



You can make a pretty good battery jig with things that most people have lying around the house (you know how I love the words "no cost!"). Start with an 18-inch-long piece of 1x6-inch board. Put a 3-inch finishing nail about an inch in from the edge of the board, and lay your batteries out the way you want to set them up. Now put a second nail at the end of the row of three, four, or six batteries. Make sure that the nail is vertical. It should be snug against the batteries, but not too tight. Now slide a short piece of fuel tubing over the nail until it touches the side of the battery. This will prevent the cells from moving around as you glue them into place.

I've tried a lot of adhesives, but I use Shoe Goo* to keep my cells together. It prevents the pack from coming apart in a crash, and when you have to rematch the cells, you can easily peel the Shoe-Goo off using a pair of needle-nose pliers. I like it much better than CA because it doesn't tend to dry up, split, or crack shrink-wrap like CA does. Put a glob between each cell in the pack, then dip your index finger in a cup of water and smear the Shoe-Goo evenly along the joint (the water will prevent the Shoe-Goo from sticking to your finger). Let the assembly set overnight, and then flip the pack over and glue the other side. This side should also set overnight to cure. Solder the cell connections using the battery bar of your choice.



Are you sick and tired of finding that CA makes your off-road tires stiff and cracked at the rims? Unhappy throwing away good rims that are shod with worn-out tires that you can't remove? Ready to give up on bogus de-bonders? Try using contact cement! That's right, the same glue you use to mount foam tires works pretty well on off-road stuff and Tamiya* Sedan tires, too! You'll need to rough up the rim grooves a little using a rotary grinder and a narrow sanding drum or disk. Use the same guidelines I gave you in tip no. 2 regarding drying time and lacquer thinner. Contact cement seems to work just as well as CA in terms of keeping the tires on the rims, and you can remove the tires by soaking them in lacquer thinner for a few hours.



Speaking of battery bars, here's a tip for those of you who just can't stand to throw away those little bits of leftover heavy-gauge wire: cut them into 1-inch pieces and use them as battery bars! I've done this for years, and it really works (after all, if 12-gauge wire is good enough for an ESC, it should work just as well for batteries). Just strip the last

1/4 inch of wire on each end, tin it with solder, and use it as if it's a regular battery connector. Be aware, however, that this type of connection will make the pack a little bit wider than it would be with flat bars. Make a pack and see if you have room in your



car or truck's battery compartment; if so, you can save a couple of bucks per pack!

Customize your radio. Some folks like the wheels that come on their radio systems, but others (who have big hands like me) would prefer a larger wheel. I have yet to find a way to make the plastic center part larger, but you can slip an untrued, front, 1/10-scale donut over the wheel (take off the original foam ring first) and true it down on a tire machine a little at a time until it's just



the right size for your hand. Any foam compound will work, but you may prefer softer (yellow) or harder (blue or orange) foam. You can also use contact cement to glue a thin sheet of latex foam onto the hand piece where your sweaty palm fits—great for those really hot days. Want a larger-diameter trigger? Slide a piece of large-i.d. silicone fuel tubing over the trigger. With some luck, you may even find colored or fluorescent foam or fuel tubing to give your radio true individuality. Try it!

Do you have some ideas that the rest of us should know about? Write to me, the R/C Car Doctor, c/o Car Action, 251 Danbury Road, Wilton, CT 06897, and let me hear about them!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153. ■



What's new in nitro?

In this month's "Nitro News," I look at several new products for gas racers.

HEAD GAMES

- From CRC*. Several after-market heads are available for .12 engines. Most are single-piece designs with several fins,

two-piece design with a separate head button. But CRC's button is different; it's designed to use the turbo plug usually found on .21 racing engines. A turbo plug doesn't use a washer to seal the plug to the head; its tapered base does the job. This tapered fit is said to allow better

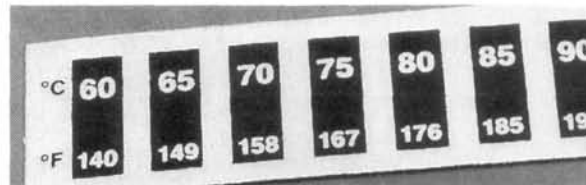
heat transfer between the plug and head. Also, because the turbo plug is

band mods. The CRC head is very large, so it will dissipate heat rapidly. Oh, yeah...it comes in purple, blue and silver.

On the top of the head, I mounted CRC's Quick Temp liquid-crystal tape. Unlike other tapes, it isn't a one-shot deal.

you know which section of tape should be "lit." Just pull it in, and look for a green/blue color on the 194 degrees F section.

- From MIP*—a heat-sink head to fit the .12s. Unlike other heads, the MIP unit is "pre-decked,"



CRC's Quick Temp Tape

On one strip, there are seven temperature segments that indicate tem-

so only one .002 head gasket is needed for the right clearance. The head

A turbo plug doesn't use a washer to seal the plug to the head; its tapered base does the job. This tapered fit is said to allow better heat transfer between the plug and head.

tapered, its tip, which is open to the combustion chamber, is smaller and fits the shape of the dome better.

CRC worked hard to produce a dome shape and squish band that would increase power without increasing the compression ratio. If you don't want to use turbo plugs because they cost more, you can use a standard plug button with the same dome and squish-

and they dissipate heat more effectively than the stock units. Though most after-market heads are good and will reduce an engine's operating temp, this new head from CRC is worth checking out.

Like the head sold by OFNA*, CRC's head is a

peratures from 140 degrees Fahrenheit (F) to 194 degrees F (Celsius readings are also given, but I didn't use them). The segments can be cut into single units and arranged on the head's top fin. The reading isn't the same as that obtained from a temp-gun reading because the top of the fin is cooler than the plug, but you can still judge the temperature correctly. My

Yokomo .12 runs well at 210 to 220 degrees F as measured by my Raytech temp gun. With the Quick Temp tape, the reading was 185 to 194 degrees F. All I have to do is keep the needle setting so that the tape registers a temperature within that range, and I'm all set. Readings are fast because

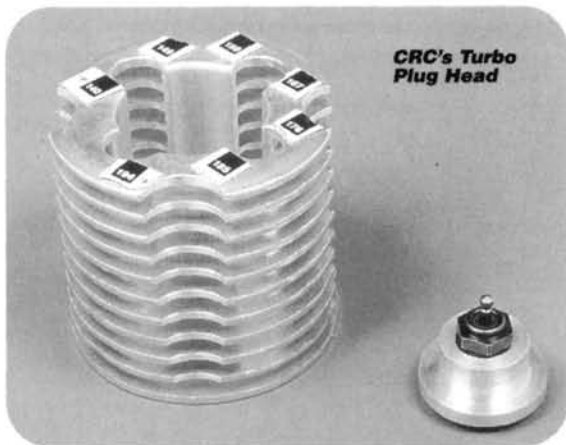
comes with a McCoy no. 8 plug and is anodized purple to match their



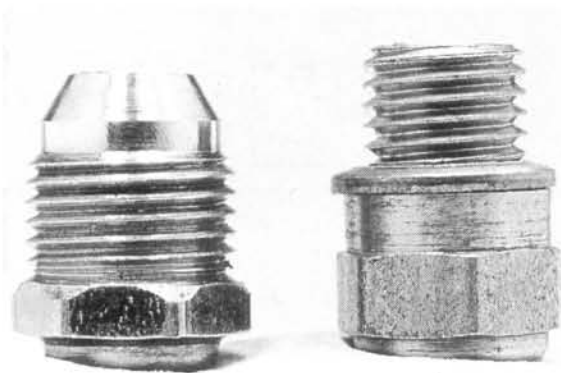
MIP's heat-sink head

tuned-pipe system.

Both the MIP and CRC heads will offer a significant gain in cooling capability, but the turbo head should only be used by veteran racers. Both heads will fit the CZ-R, the CZ-Z the Dynamite, and the Yokomo.



CRC's Turbo Plug Head



Left: turbo plug, right: standard plug.

NITRO Q&A

Q I recently bought my first R/C vehicle—a Traxxas Nitro Hawk. After numerous engine problems, Traxxas sent me a new engine. After installing the new engine and running 15 tanks of fuel through it, the clutch bell and spur gear had chewed each other up. I replaced both, and now, after four tanks, there's noticeable wear on the clutch bell. According to Traxxas, 20 tanks is the average life of the aluminum clutch bell, and 60 for the hardened-steel one. One of my friends has a Rampage truck and one has an RC10GT with a Yokomo .12, and both have run well over a gallon of fuel through their trucks with no wear problems like this. With the engine and tranny positions set, there's no way to adjust the way the clutch bell and spur gear mesh. Is there any way to fix this that you know of?

JEFF MARTEN
Colorado Springs

A Jeff, I can't explain exactly why, but some parts wear out sooner than others. On many of my gas cars, I notice wear on the clutch bell before the spur. You would think that because the spur is nylon, it would wear out sooner, but that's not always the case. I think a lot of the wear has to do with the surface you drive on. If run on smooth, clean pavement, I bet a set of gears would last almost forever. On the other hand, a sandy beach will probably chew up any set of gears in just one tank. If you have the aluminum bell, get the steel one; it's much stronger. After that, there isn't too much you can do. You should try to adjust the mesh by slightly slotting the motor-mount holes, but make sure that the mesh isn't too tight. Make sure there isn't any chassis flexing that could alter the mesh.

Also check to see how much clearance there is between the chassis and gears. On my GT, I kept getting small pebbles jammed between them, and it stopped the car dead. I cut an opening in the chassis below the gear that allows these pebbles to drop out. Good luck!

Got a question about gas?

Send your letters to Nitro Q&A, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897.

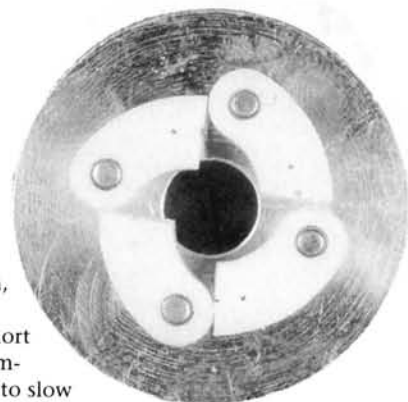
CLUTCH TECH

• From Associated*—an upgraded clutch for the RC10GT. For better acceleration, the new system uses a four-pin flywheel and four shoes instead of two. The shoes are the same as in the four-shoe clutch, but you have to cut them smaller. As well as benefiting acceleration, the four-shoe setup also helps to slow the truck down using "compression braking." When you release the throttle when you're going fast, most clutches disengage right away and allow the vehicle to freewheel until the brakes



are applied. With the new four-shoe clutch, the engine stays engaged for a short time, and its compression is used to slow the car down. It's a similar effect to downshifting in a full-size car; you're using the engine to slow down.

• From MIP—a new clutch for the GT, but theirs is a two-shoe design that works with the standard flywheel. According to MIP's president, Eustace Moore, the 4-N-1 clutch works so well that the slipper clutch isn't needed. They tested the clutch at the Mid-



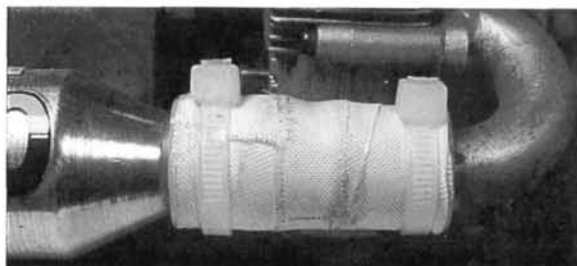
Above: Associated's new four-shoe clutch; left: MIP's 4-N-1 clutch.

Atlantic Gas Challenge in the dry stuff and in the rain, and it performed well in both. The clutch uses a spring and small metal weights to adjust the engagement. I haven't tried it yet, so I don't know whether it has the same compression-braking effect as the Associated clutch, but I've heard great things about its acceleration.

CONCRETE COUPLER

When you're racing, only one thing is worse than having your vehicle go silent, and that's having it get suddenly loud. If you lose the coupler between your pipe and header, your race is over. Sure, you'll still be able to drive the car, but in most cases, you'll be asked to pull over to fix the problem. It's just as well, because without the connection, your pressure system is shot, as is your tuned exhaust.

Well, you can use all the tie-wraps you have, but the coupler connection is only as strong as the material you use. A silicone coupler is what most of us use because it's easy to cut and forms a good seal between the pipe and header. But, with much use, the heat of the exhaust gases can make the silicone deteriorate, and because it's soft,



Dynamite's Thermal Set Coupler Tape

it can be torn or punctured. Boat racers wrap the coupler with a thin brass sheet to prevent it from simply blowing apart, but this only works on a straight connection.

Dynamite* has come up with a product—Thermal Set coupler tape—that seems to stop coupler blowouts. A roll of the 3/4-inch-wide tape costs just over five bucks, and you wrap it around your standard coupler like a bandage. When heated by the engine, the tape layers meld, forming a solid "cast" that strengthens the silicone coupler.

I just received a sample roll and haven't done extensive testing yet, but it does make the connection much more solid. Dynamite claims they've put more than an entire race season on a few couplers, and they still work great. This is a big improvement over the couple of weeks that they usually ran with just a coupler before it disintegrated.

*Addresses are listed alphabetically in the Index of Manufacturers on page 153. ■



SCI Viper

VIPER—one mean electronic speed control. I first reviewed the Viper in the September '93 issue, but SCI* has improved it, so it's time for an update. The Viper is an all-out, microprocessor-controlled, racing ESC with:

- a choice of three motor-drive frequencies (the ear-

- lier Viper had only two);
- a current limiter (punch control);
- low "on" resistance.

But its ease of programming—all controlled by a single button on the top—sets the Viper apart from other programmable ESCs. The instructions tell you how in great detail, and there's even a programming chart printed right on the Viper's label. The Viper is different from most speed controls because it doesn't have any adjustment pots, so reading the instructions is mandatory!

A full set of error codes flashes on the Viper's LED display to warn of faults such as: the transmitter is off; the voltage is too low or too high; there's an overload, e.g., the gears are jammed; and the FETs are overheated. Between heats, when time is short and things just aren't going right, this feature can be invaluable.

To look inside, I removed four screws—space-age electronics; most of the Viper's "brains" are in a single, 8-bit, do-it-all, surface-mounted chip. Eleven Megafets occupy most of the space on the circuit board. These control the flow of current when going less than full speed, and they allow an extremely low "on" resistance when going at full speed.

VIPER AT THE VETS

Let's examine this creature! First, I noticed that the instruction sheet doesn't give the recommended settings for the trim pots, reversing switches and throttle-

travel controls that I have on my Futaba* Magnum AM radio. I set the reversing switch to reverse, ATV high and low to 10 (maximum), sub-trim to 0 (center), TH. ATL to 10 (maximum), and TH. TRIM set to 0 (center), and that worked very well. This maximizes the pulse range coming out of the receiver's throttle channel and places the trims in the center. I set trigger travel to one third; this provides two thirds of the trigger travel for forward and one third travel of brake travel.

Next, I matched the Viper to my transmitter. When you understand the sequence, this is easy. When I had the Viper operating, it was time to get some "on" resistance numbers. With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's "on" resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs. I always run this test first because "on" resistance is one of the most important features of a speed control. High "on" resistance means wasted battery power and a smoking-hot speed control.

With the 12 amps of test current flowing, I measured a 0.17V drop from end to end of the Viper (including connectors). This places the end-to-end "on" resistance at 0.014 ohm. With the

same 12 amps of current flowing, I measured a 0.09V drop at the 2-inch point on the battery and motor wires. A little calculating places the 2-inch resistance at 0.0075 ohm.

A couple of observations can be made by looking at these two "on" resistance numbers. First of all, there's close to a 2:1 difference between the end-to-end resistance and the 2-inch wire resistance. This points out the need to keep the battery and motor wires short and replace the power robbing connectors. In my racing program, I always direct-wire my motor, thus eliminating the bullet-style motor connectors. I got rid of the Tamiya-style battery connectors, and I'm currently using a set of Litespeed* connectors. They're inexpensive and approach zero loss.

I "cook" every control I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. This is equivalent to dumping several battery packs back to back without cooling down between dumps. I did install the optional heat sinks (SCI part no. 1400). The Viper's case divides the FETs into four groups, so it's impossible to install the more conventional one-piece heat sink. This isn't a problem with the SCI heat sinks, however, because they come in four short segments. So with the heat sinks installed, but without any cooling air flowing, I let the control cook at 20 amps for 15 minutes. At the end of this time, the Viper was just a little warm. Of course, I



FEATURES

- Racing-style speed control (forward only with brakes).
- Eleven FETs to handle the power (nine for forward and two for brakes).
- Five to 10 Ni-Cd cell capacity.
- Six programmable functions: full throttle point, neutral point, brake point, current limit and high/medium/low frequency operation.
- Battery-eliminator circuitry.
- Built in pulse-checking/programming-indicating LED.
- Gold-plated Tamiya-style battery connectors and bullet-style motor connectors.
- SCI multiconnector receiver connector set adapts to all popular receiver brands.
- Comes with an instruction book, a motor capacitor kit and SCI decals.
- Was tested with optional heat sink no. 1400 (set of 4).



could have told you that the Viper would be a cool customer by looking at its low "on" resistance numbers.

SIDEWAYS AGAIN

It was now time for the track test. I was a little pushed for time, so I

mounted the Viper in my trusty Kyosho* Sideways. Although the instruction manual doesn't have a diagram of a Viper connected to the various components, such as the battery and the receiver, it very clearly identifies the various wires and controls. This and a full set of battery, motor and receiver connectors should make the installation simple—even for a newcomer.

With the Viper installed and several 6- and 7-cell packs charged, I headed to a local school parking lot for the road test. For the first run, I set the Viper to the high-speed motor drive and set the current limit to maximum. This proved to be a wheel-spinning, wild-driving car—just the ticket for having fun in wide-open parking lots. Acceleration was good, speed was blinding, and run times were what I expected with the gearing that I have in my Sideways. At the end of the run, a quick check of the heat sinks found them to be almost at room temperature. Again,

the cool running is the byproduct of the low "on" resistance.

On subsequent runs, I played with the current limit and the three motor-drive rates. With the current limit set to its minimum level, the violent wheel spinning was brought under control; however, the top speed was still quite good. Oddly enough, my car seemed to run the best on the lowest motor-drive frequency. That's the beauty of the Viper: you can set it up for your car, your driving style and the track.

The only strange thing that turned up during the driving test was poor acceleration when the battery started to dump. When this happened, the LED flashed between yellow and green. A check of the error codes in the instruction book revealed that yellow meant low battery voltage. So, when I punched the throttle with the battery almost dead, the heavy current draw of acceleration caused the battery voltage to drop below the acceptable level of the micro-processor in the Viper. The Viper then stopped the current flow and flashed the yellow warning light. As the car came up to speed, the current dropped to a lower level, allowing the voltage to stay at an acceptable level. Eventually, when the battery voltage dropped low enough (the battery dumped), the LED

SCI Viper

DIMENSIONS

Height (with heat sink).....1.20 inches
Width1.50 inches
Length1.63 inches
Weight (with wires)3.0 ounces

TUNING

Access to controlsExcellent
Ease of adjustmentGood

WARRANTY6 months

ELECTRICAL (Manufacturer's specs)

Max. voltage12 volts (10 cells)
Min. voltage5 volts (4 cells)
Cont. current1,200 watts
Resistance0.002 ohm

TEST PARAMETERS

Voltage6 volts
Current12 amps
Voltage drop
—along full length of wires0.17 volt
—2 inches along wires0.09 volt

CALCULATED RESISTANCE

Resistance
—along full length of wires0.014 ohm
—2 inches along wires0.0075 ohm
BEC voltage, 6-cell pack4.95 volts
Resistance = voltage drop/current

small and light, so it will fit in almost any car, buggy, or truck. It comes with a complete set of factory-installed motor and battery connectors. These make it very convenient for the first-time racer to install the Viper, but they do rob some power from the motor. Remember, if you change the connectors and wire something backward, you'll destroy a very expensive piece of hardware.

The fact that the Viper is programmable might tend to scare off folks who just can't deal with computers; however, it's very easy to program. The instruction book takes you through the procedure step by step,

and the label on the Viper has a color-coded program chart that guides you through the procedure at the track.

I found the Viper to be a cool-running control that provided hot performance. When the battery is about to dump, the Viper goes into a soft acceleration mode that's designed to prevent runaway and/or steering lock. By this time, the battery is so low that there's little or no speed left in the car, and this permits the safe return of the car to the pit area.

Are you looking for a state-of-the-art micro-processor speed control that's intended for racing? Then give the Viper a close look; it may be just what you're looking for.

*Addresses are listed alphabetically in the Index of Manufacturers on page 153. ■

changed from green to steady yellow and the car didn't run at all. Of course, by this time, the battery was so low that it didn't matter anyway. This arrangement prevents runaways at dump time.

CONCLUSION

This new Viper is quite similar to the earlier version. The major change is the addition of a third motor-drive frequency. You can now set the motor drive to high, medium, or low. High should provide the most efficient, cool operation, and low should provide the least motor noise. Medium may well provide the best compromise between the two. With a little experimenting, you should be able to find the motor-drive frequency that best suits your driving style.

The Viper is fairly

COMMENTS:

SCI of Austria has upgraded its high-frequency, programmable speed control. It's as mean as a snake and is named accordingly: Viper. It's extremely easy to program. After you've walked through the sequence once (following the detailed steps in the instruction book), it becomes second nature. Besides, there's a programming chart printed right on the label.

The Viper not only has the usual programmable features (transmitter matching and punch control), but it also has selectable high-, medium-, or low-frequency motor drive. The earlier Viper had only high and low motor drive modes. You would normally stay in the high-frequency mode and switch to the low-frequency mode if you experience radio interference or auto-count problems. With this Viper, however, you can try the medium-frequency motor drive to see if the problem goes away and still retain some of the smooth driving characteristics of a high-frequency control.

The small, light Viper should fit in almost any car, buggy, or truck. If you're looking for a new, trick speed control, check it out.



S tadium Screa



OFNA

Blazer SST

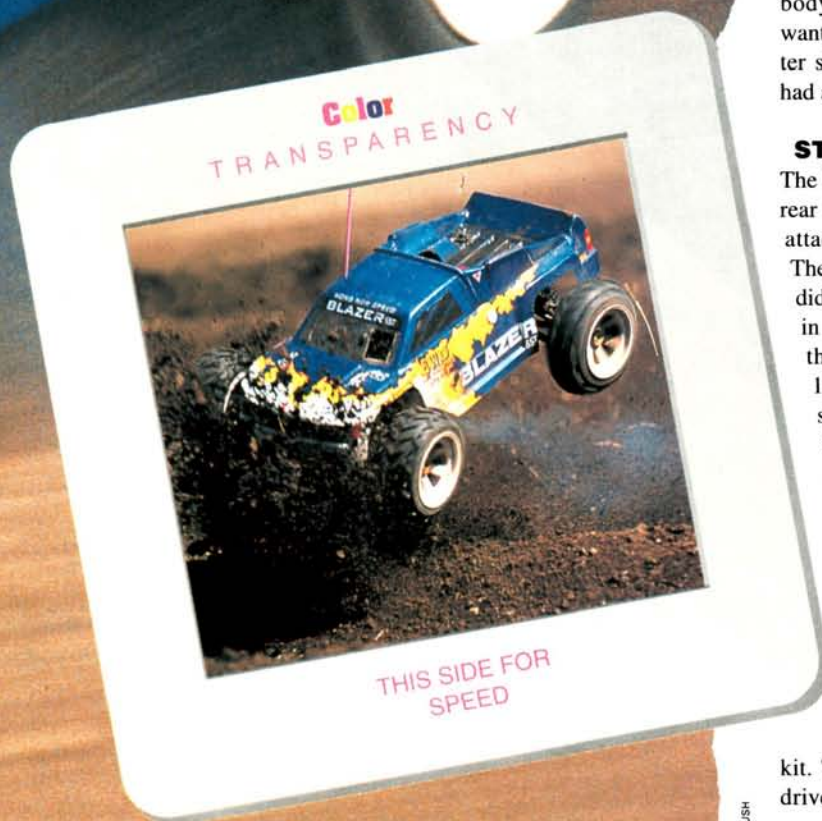
by A.R. FLATBUSH

CRUISING THE PITS at the Hemet Gas Challenge, I was jazzed to see Dave Morales racing OFNA's* brand-new, HODR-based Hong Nor Blazer SST (Super Stock Truck). It was love at first sight—the truck, not Morales! The kit was so cool that I had to have one. HODR owners can order the conversion kit (part no. 33000) that includes a body, mounts, decals, wheels and tires, but I wanted to try the Blazer's new direct-drive center shaft. It wasn't long before this gas fanatic had a Blazer and an OFNA Force .21 engine.

STAND BACK; MADMAN AT WORK

The kit comes partially assembled. The front and rear diffs, bulkheads and suspension arms are all attached to the 3.2mm Duraluminum chassis. The steering rods are also complete, although I did have to adjust front-wheel camber and toe-in when the shocks were in place. I shortened the outer tie rods three full turns each for 1mm of toe-out (for more aggressive slow-speed cornering), and I set the front camber to 0 degrees at ride height (with the drive dogbones level). The rear camber was fine at -1 degree at ride height. I was also pumped to see the wheelbase set up long and the steering angle at the more aggressive 17.5-degree setting.

Right away, I noticed a few differences between the Blazer SST and the HODR buggy. The Blazer comes assembled with the direct-drive center shaft, but a center diff also comes with the kit. The center diff makes the Blazer easier to drive, while the shaft puts more power to the ground. There's only one brake disk with this setup, however. The Blazer doesn't have front universal shafts or a rear sway bar like the HODR, nor does it come with chassis rock guards. For a lower profile in back, a front shock



PHOTOS BY A.R. FLATBUSH

The Blazer's chassis is based on the HODR gas buggy. To help beef things up, I added optional chassis-stiffening rods.

tower is used in place of the tall rear HODR plate. This lays the rear shocks down more and makes the truck drive even more smoothly through corners. Also, the shocks and radio plates aren't anodized like the HODR's. Because my test track is one of the most brutal on Earth, I made some chassis stiffeners for the SST. I ran two tie rods from the center plate to the steering stiffener plate, and I made a rear chassis stiffener out of threaded rod, brass tube and a fiberglass arrow shaft. The Blazer body mounts can't be used with OFNA's tower-to-tower graphite stiffener, so I had to make do with these three rods and a graphite L-bracket along the left side of the chassis from the steering servo to the engine mount. With these stiffeners, I had no problems with chassis flexing. Later, I tried the new OFNA braces in place of my homemade ones and had even better results.

ALMOST READY TO ROCK 'N' ROLL

I bolted OFNA's Force engine (and the included header and pipe) right into the Blazer with zero hassle. I added an O-ring on the Force's exhaust header and JB Weld* to the pressure fitting for a better seal. Before driving the SST, I added two forms of cheap insurance:

a throttle-return spring and safety springs on the foam filter's plastic cage. Nothing damages a gas car—I mean truck—like dirt in the engine or a radio-induced runaway.

I initially filled the shocks with Associated* 40WT silicone fluid (I later went to 45WT in the front shocks), and then I set about rigging the radio gear. I laid the Sanyo 6V receiver battery flat on the chassis and built mounts for a lower center of gravity. I installed a Futaba* receiver and two S9301 servos and a heavy-duty Kimbrough* gas-car servo-saver on the steering. After I had driven the SST in this configuration, I decided to add the second brake disk for more stopping power.

Finally, I slammed the Fox* painted body as far down as it would go and broke the engine in with two tanks of fuel. Now I was ready to subject the pristine truck to the dirt.

LOVE AT FIRST FLIGHT

Hong Nor wasn't lying when it named the Blazer SST. The truck blazes out of corners and launches into the air like a Concorde SST! My knees were shakin' and the ground was quakin', and the SST caught more air than I had ever thought possible. The direct-drive center shaft and the explosive Force engine combined to launch the

Blazer forward whenever I goosed the throttle. The truck accelerated so quickly that I imme-

OFNA BLAZER SST

Scale 1/8
Price \$336.95

DIMENSIONS

Overall length 17.5 in.
Wheelbase 12.6 to 12.8 in.
Front track 11.0 in.
Rear track 11.0 in.

WEIGHT

Gross (RTR) 7 lb., 1 oz.

CHASSIS

Type Pan
Material Countersunk
3mm aluminum

DRIVE TRAIN

Primary Clutch
Transmission Gear
Differential(s) Planetary gear
Bearings/bushings Bearings

SUSPENSION

Type (F/R) Lower A-arm with
upper control link
Damping (F/R) Oil-filled,
coil-over shocks

WHEELS

Front: Type One-piece plastic
Dimensions 3.5x2.1 in.
Rear: Type One-piece plastic
Dimensions 3.5x2.1 in.

TIRES

Front/Rear Spike/V-pattern
Dimensions 5.1x2.1 in.

POWERPLANT

Engine Force .21
Pipe Hong Nor Speed
Carb Slide

OPTIONS AS TESTED

Futaba Magnum AM radio with S9301 servos and R112JE receiver; HODR swing shafts and torsion bar; Blue Thunder* 20- and 30-percent nitro fuel; Sanyo* KR600AE 6.0V receiver pack; OFNA 1/8-scale wheel foam.

HITS

- Simple design • Easy assembly
- Highly tunable for various tracks and driving styles • Choice of direct drive or center diff • Excellent tires, cornering and stability.

NEAR MISSES

- Lacks some of the HODR's features
- Chassis flex can cause engine mounts to loosen • Tires/wheels illegal for racing.

Trick Parts and Setup Tips

- All hop-up parts for the HODR will work on the SST. I opted for: aluminum arm brackets (part no. 31170); aluminum motor mounts (part no. 31190); aluminum center mounts (part no. 31060); aluminum servo mounts (part no. 31180); a steel spur gear (part no. 31040); a steel bevel gear (part no. 31010); special front-arm balls (part no. 30092); ball-bearing steering (part no. 31130); front half-shafts (part no. 30070); a rear anti-roll kit (part no. 30340); and silicone bladders (part no. 2033).

- OFNA makes a rear rod-brace kit (part no. 31023) and a front brace plate (part no. 30660) that will stiffen the Blazer so you won't have to make everything, as I did. You may never abuse your SST enough to need bracing, but I'm a real basher on equipment.

- When the motor is lined up properly so the clutch teeth and the spur teeth are aligned, remove the assembly and tighten the four hex-head screws that secure the motor to the motor mounts. I couldn't get them tight enough with the motor in the truck.

- Use thread-lock on all metal-to-metal fastenings—especially the wheel hub and outdrive setscrews, the front hub screws and the shock-shaft nuts.

- The aluminum motor mounts have more recessed chassis-to-mount screws; this provides a smoother undercarriage. Associated chassis protection film will make your chassis even slicker, and it keeps dirt out of the screw heads.

- Be sure to zip-tie the air filter, the fuel/pressure lines and the silicone pipe junction. I also used a zip-tie and extra fuel tubing to make a grab handle for the spring-loaded fuel filp-top.

- To simplify starting, I widened the flywheel slot in the chassis.

- Before I attached the finished body mounts to the diff housings, I cut off the excess portions of the body hooks so that they wouldn't interfere with wheel travel.

- I bought a 0.30-inch-thick piece of flat Lexan and made chassis rock guards and roost guards for the suspension arms.

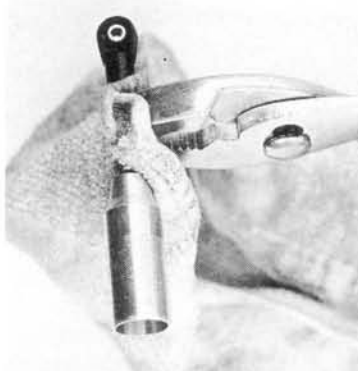
- The instructions recommend front toe-in at zero, front camber at zero and rear camber at -1 degree (at ride height). Rear toe-in is set at 1 degree.

- For more braking power, I used the brake hardware in the center diff bag and set both brakes' bias to apply equally.

BLAZER SST

diately realized that more brakes were needed. (The 1/8-scale fast guys use four or even six disks; one just doesn't cut it.)

Turning and overall handling are also awesome. The Blazer has wider, more aggressive tires than its competition, so it's much more sure-footed in any driving condition. The wheels also give the SST a wider stance than its competition for more cornering stability. It's almost impossible to flip! The low-profile SST tires don't balloon up on straights or flex in corners as much as other 1/8-scale truck tires. If only these tires and



To avoid scratching the shock shaft, use a wrench (as shown) to install the lower shock mount. Let the thread-lock dry before you fill the shock with oil.

wheels were legal for sanctioned competition....

The stone-stock Blazer blazed some of the quickest laps ever to be turned on my test track. Part of this also had to do with the kit's exhaust pipe. This chamber delivers a hard-hitting mid range and almost insane top end. It doesn't produce much bottom, though, and it frustrates tuning somewhat. Low-speed tuning is hard to dial because the pipe tends to load up the motor at

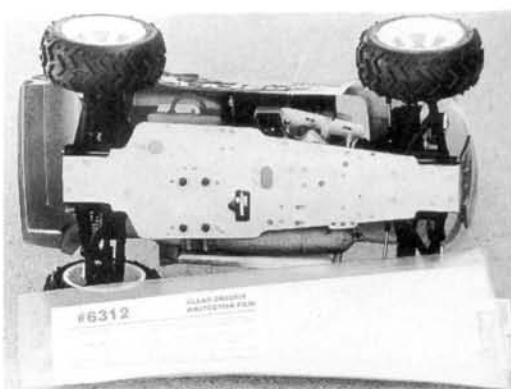


The power for this monster beast is provided by the Force .21 engine. It's a good engine at a good price.

low revs. A gas novice can easily make the low speed too lean and high speed too rich to compensate. When the low speed is properly adjusted, raw fuel blows out of the pipe at idle. A first-time gas fanatic may be better off learning with the kit's center diff, too. You'll lose some of that awesome acceleration, but the truck will be easier to drive in rough sections.

Being a more experienced frequent flier, I prefer the kit's radical center shaft with two brake disks. This combination improves braking and launches the Blazer out of corners like a rocket. Yep, the Hong Nor/OFNA Blazer SST is the new Top Gun in the Flatbush Air Force. Each kit ought to come with a fire extinguisher so that you can put out whatever crashes and burns trying to match your pace.

**Addresses are listed alphabetically in the Index of Manufacturers on page 153.* ■



I coated the underside of the chassis with Associated's protective chassis film. It covers all the screw heads and prevents them from becoming damaged or packed with dirt.



TAMIYA

Mitsubishi Pajero

Imagine you're in an exotic land, driving through the jungle in search of the lost secrets of some ancient culture, or scaling the rocky slopes of the Andes mountains foothills. Perhaps your fantasies take you skimming over the sands of the Sahara Desert, heading for Northern Africa.

Many of us became interested in radio control because of fantasies just like these. We bought our first cars or trucks because of their scale realism, not their performance potential. While other drivers were seeking the ultimate in graphite and "unobtainium," we were bent over the workbench, trying to get the rivets in the right place and the body trim painted juuuust right.

If you're one of those who have been asking for more R/C kits with a high degree of scale

realism, you'll be pleased to learn that Tamiya* has been listening. Their new Mitsubishi Pajero kit duplicates much more than the look, stance and body of this rugged off-roader; even the drive train and suspension mimic those of the full-size 4WD vehicle! Tamiya has done much more than put a scale car or truck body on a pure R/C chassis.

The front suspension consists of fixed upper and lower arms supported by oil-filled coil-over shocks. Drive shafts that run directly from the forward gear differential carry power to each front wheel through hardened, chrome-plated axles. A midship transfer case brings the power down through the chassis and is connected to a beefy U-joint-equipped drive shaft. Out back is a true, scale, live axle anchored by twin trailing



SERIOUS **S.**
SPORT

by Doug Mertes

arms and two more oil-filled shocks. (The only other live axle I've ever seen was on Tamiya's Mountaineer.) Inside the axle housing, there's an all-metal gear diff that can also be built to lock fully for exceptionally slippery surfaces. The wheels are chrome-plated replicas of the real thing, just like the corresponding BF Goodrich lugged rubber tires.

Though no one would seriously consider this a truly race-ready high-performance kit, the finished product can do, in a smaller scale, everything the real Pajero can do. Let's look more closely at this mini mountain climber to see what it's made of.

PAJERO PAINT

To complete the kit, you'll need a transmitter, a receiver, two servos, a 6-cell stick battery pack and a battery charger, along with paint for the body and trim in your choice of colors. The manual lists stock Mitsubishi color combinations for the upper and lower body sections, so you might want to refer to page 17 of the instructions before deciding which colors to use. Remember that this isn't a Lexan body; for polystyrene, you need enamel paint, not polycarbonate paint. I used Testors* Modelmaster Enamel System, but several other brands will work just as well. To avoid having problems with paint incompatibility, I would, however, recommend that you use paints all made by the same manufacturer. Using different brands of paint will lead to bubbles and other flaws in the surface.

I started by scrubbing the body with a steel-wool pad and warm water, then I washed it with hot soapy water and rinsed it well. After drying the body with paper towels, I ran a hair dryer set at "high" over all the corners and little crevices to make absolutely sure that all the water had been evaporated off. Two coats of primer were followed by four coats of British Green Metallic and two coats of Clear Topcoat. After letting the paint dry for a week, I carefully masked off the upper part of the body and painted the

lower part with German Silver.

But I wasn't happy with the result; the car simply looked too fat and chunky. I repainted the silver lower half with British Green, and that's how I left it. (That's one nice thing about polystyrene bodies: you can change your mind about the paint scheme a lot more easily than you can with Lexan!) The rest of the trim details—in Flat Black, Stoplight Red and Turn Signal Amber—were filled in by hand with a small brush and a lot of patience. A small, but adequate, decal sheet provided the necessary insignias and lettering. The result is well worth all that work, don't you think?

CONSTRUCTION

If you've ever built a Tamiya kit, you'll agree that their instructions rank among the finest in the industry. The instructions in this kit are no exception—detailed illustrations, a list of parts needed for each step and clear, concise directions in several languages. The pieces come in tagged bags or on lettered parts trees. To ensure that they fit properly, be sure to remove all the flashing, or "gates," from every molded part. My method is to lop the parts off the tree with a pair of side cutters, and then trim off the flashing with a hobby knife.

I also opened all the little screw-filled celophane bags and put their contents, along with their respective tags, in zip-lock-type sandwich bags, which give me a little more room to poke around in and find exactly the part I need.

As you build the kit, you'll probably also notice the different types of plastic used for the various parts. Some are noticeably more flexible than others; some are very stiff. The plastic mix used for a stiff tub-type chassis just won't last if it's used to mold suspension parts that must flex while they absorb a pounding! This kind of sophisticated attention to the molding process is what has made Tamiya the leader in plastic R/C kits.

* The instructions tell you not to use thread-lock, and they're right. Most locking compounds contain a CA-type glue that attacks the plastics used by Tamiya, even with only minimal contact. (Does this sound like the voice of experience?) Instead, put a *tiny dab* of Shoo-Goo*, or a similar RTV (room-temp vulcanizing silicone) on the threads of the Pajero's various setscrews. Believe me, you *don't* want one of those backing out inside the transmission, or when you're out in the woods!

* If you lose the little measuring device that's used to set the distance between the pinion and the motor can, just set the top of the pinion 14mm (9/16 inch) from the can's face. That will result in the proper pinion-gear-to-spur-gear distance when the motor is installed.

* Before you install the kit motor, oil the bushings. You won't be able to do it afterward!

* In step 3 of the instructions, note the recess in the drive gear that accepts the stepped shaft. If you don't install this part properly, you'll find it impossible to fit the transmission pieces together, so pay attention!

* In step 5, use the *gold* 3mm screws from bag "A," not the black ones. And when you trim off the flashing, be sure that you don't cut the little tips off part D13. Remember to install a bushing or bearing on the forward face of the transfer-case drive-gear shaft when you drop it into its housing in the chassis. The instructions don't show it, but the gear won't rotate properly without it.

* Note that parts D3 in step 12 should *not* be installed facing the same direction on opposite sides of the chassis. One ball faces forward, the other faces the rear.

* In step 13, be sure to use the 2x8mm *machine* screws, not the self-tapping screws of the same size that are in the same bag. They're very similar, so you'll have to look closely!

* In step 18, put a drop of shock oil on each shaft end before you push it through the seals; this will prevent the seals from being damaged as the threads come through the shock body.

U.V.

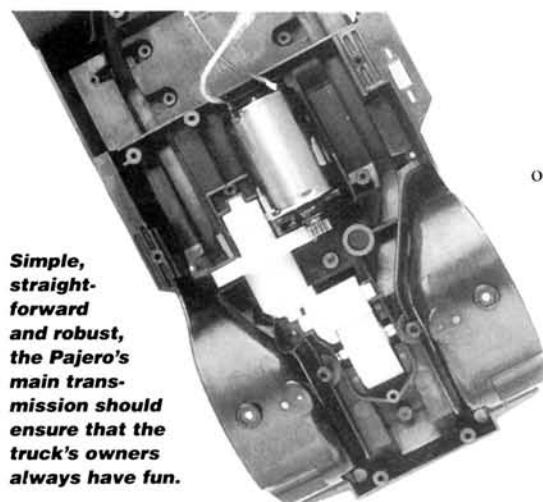
TILITY • VEHICLE

PHOTOS BY DOUG MERTES

X

DECEMBER 1994 55

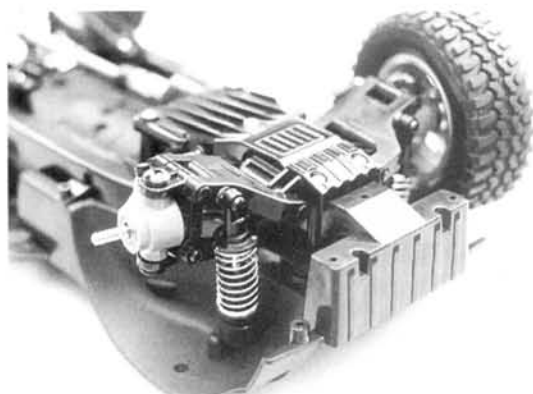
-TRA TIPS FOR THE Pajero



Simple, straight-forward and robust, the Pajero's main transmission should ensure that the truck's owners always have fun.

Tamiya the leader in plastic R/C kits.

I opted to install a full set of ball bearings in the Pajero as I went along. To outfit the kit completely, you'll need 11, 1150s, three 850s, two 1260s and two 1510s. Believe me, bearings are a worthwhile investment for any vehicle you intend to keep, even if you don't plan to race it. Though bushings provide nearly the same speed as bearings, they wear out too quickly. Bearings will maintain



The front and rear suspension systems are like the full-size Pajero's.

the critical transmission clearances and drive-train tolerances of your R/C vehicle for a much longer time.

The kit comes with one of Tamiya's standard, mechanical, three-step speed controls and a nifty Lexan cover for it that keeps out most of the dirt and grit. For a mechanical-type speed control, it works fairly well; if you plan to stick with the supplied motor, go ahead and use it. If you're a little more daring, read on.

PAJERO PERFORMANCE

To start, I built the kit in stock form, except for the bearings. After charging a 6-cell Tamiya pack and checking the radio trims with the Pajero on my workbench, I headed

out for a little fun.

Considering that it's high and has tall wheels, the Pajero handles very well; I had been afraid that it would be too "tippy" in the turns. Even in stock form, small obstacles and ruts pose no problem for this rugged vehicle, and I had a lot of fun bashing around in the deepest, darkest jungle behind my backyard. On the street, the Pajero

seemed...well...kind of slow. The same 16-tooth pinion that lets it shoot over logs and through holes in the underbrush is way too small to allow the little Mitsu to work up a respectable head of steam on the pavement. I did try the optional 20-tooth pinion gear (the tranny only accepts two sizes), but even

that gearing was too low for the street and the baseball diamond. The little guy just wound out too soon!

One of the hop-ups suggested on the back page of the instructions is the RS 540 Sport tuned motor, which I had in my toolbox. This isn't just another stock, closed-endbell motor; this is a 23-turn, single modified motor with mild timing in a black can. On a dynamometer, its readings look very similar to those of a typical ROAR-legal, 24-degree motor, yet it provides long life and extraordinary run

times and require little maintenance. The Sport motor really woke up the truck—on- and off-road. Off-road, I continued to use the 16-tooth pinion that came with the kit; for street runs, I put in the 20-tooth pinion.

Standard, open-endbell motors will fit the transmission as well, so I tried a Green Machine 2 and a Monster Stock

Junior 2 from Trinity. Once again, the truck was noticeably faster; I used the small pinion for off-road and the larger one for the street. The long run times, however, told me that, with the right electronics, I'd be able to wring a lot more performance out of the Pajero.

Just to see what would happen (yeah, I'm one of *those* guys), I dropped in some pro-level equipment: a Novak* 410 HPC ESC, a matching Novak Ner3 FM receiver to catch the signals from my JR-756 transmitter, and

a high-revving, 14-turn, double-wind modified motor from Elite Speed Products* that's based on the new Trinity EX can.

I took the Pajero to the softball field with a couple of charged Sanyo* 1700mAh SCRC packs, and

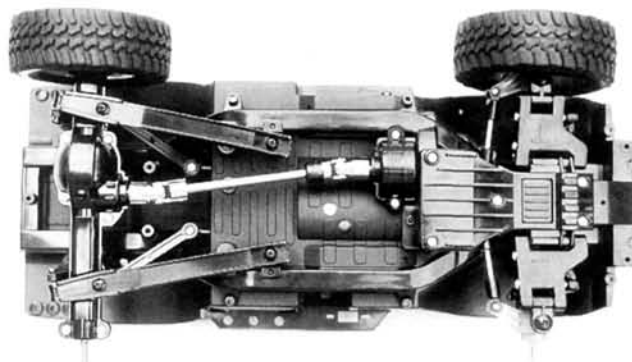
yow! No more Mr. Nice Truck! I didn't take it over any huge jumps or bounce it through too many holes while it was set up this way, because I didn't want to rip the suspension off. All four wheels threw up rooster-tails of dirt and dust that brought "Oohs" and "Aahs" from everyone within a hundred yards. I probably added more than a couple of new drivers to the R/C fold that day. (Is this fun, or what?)

PAJERO POPULARITY

Later that week, I took the Pajero to the track when I went racing. Even the jaded 1/12-scale crowd thought it was pretty cool, and the Formula 1 guys were soon talking



Inside the live rear-axle housing there's a full metal gear diff and a bevel drive.



Even the drive train on the underside of the chassis is true to scale and looks like the real thing.

TAMIYA MITSUBISHI PAJERO

Scale1/10
Price\$272

DIMENSIONS

Overall length17 in.
Wheelbase93/4 in.
Width front/rear75/8 in.

WEIGHT (gross, ready to run)3 lb., 7 oz.

CHASSIS

TypeMolded tub
MaterialHigh-impact plastic

DRIVE TRAIN

TypeGear
PrimaryPinion/spur
TransmissionGear
DifferentialGear, front and rear
Slipper clutchNone
Bearings/bushings..... Metal and plastic bushings

SUSPENSION

Front.....Lower swing arm, upper fixed arm
RearLive axle, twin trailing arms
DampingOil-filled shock absorbers with coil springs

WHEELS

Front/rearOne-piece plastic, captured bead type
Dimensions (DxW)2x1 in.

TIRES

Front/rear.....Rubber, lugged type, non-directional
Dimensions (DxW)3.5x1.25 in.

ELECTRICS

Motor.....Stock 540, closed endbell
Battery6-cell stick pack (not included)
Speed control.....Mechanical, resistor, 3-speed

OPTIONS TESTED

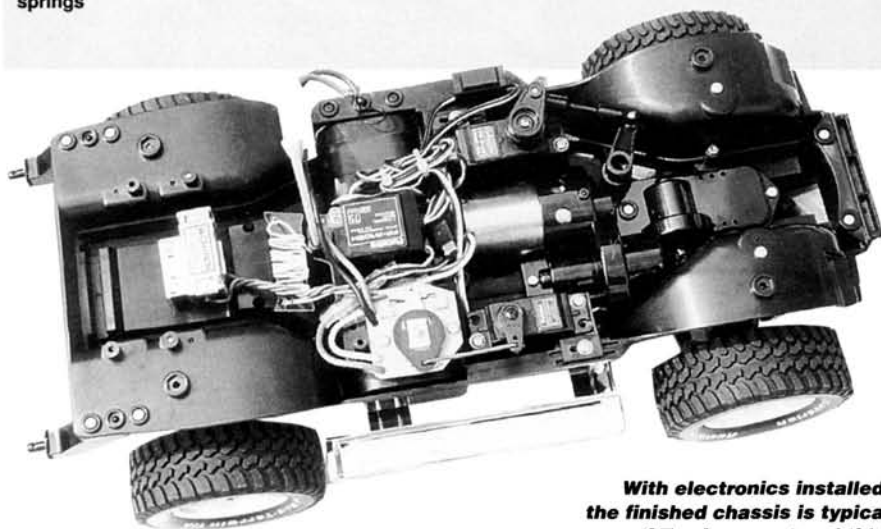
Full ball-bearing set, Futaba® 2PKA Magnum Junior radio with 132H and 148 servos. (See text for additional radio and motor options tested.)

HITS

Incredible realism • Very rugged • A real attention-getter.

MISSSES

Low top speed in stock form with kit motor.



With electronics installed, the finished chassis is typical of Tamiya—neat and tidy!

with the track owner about a race series based on the truck. Everyone who came into the track's store that night seemed to wind up holding the Mitsubishi, and the store owner asked me to bring it back for a longer visit sometime soon!

My family gave the Pajero its final performance test. Every year, we go to a remote beach for a week of sand and fun; and every year, I build a new R/C car or truck to play with. During previous vacations, the only one my family had shown any real interest in was Big Blue—a more or less stock Clod Buster that's set up to run in the sand (we even have lights on it to chase the sand crabs late at night). This year, poor Blue was eclipsed by the new kid on the block. I don't think a day went by in which we didn't run through at least four or five battery packs! (And yes; Tamiya does make a lighting

set that fits.)

Tamiya's latest scale offering isn't a real race truck, but 95 percent of all R/C vehicles sold never even see a racetrack, so it won't make much difference to those who are interested in this kind of kit. Sure, the racing purists will sniff at it, but you'll have more fun driving this little go-anywhere truck than you will with a lot of racing-oriented hardware. It's tough, too—tough enough to survive a week with my wife and 12-year-old at the beach. And it looks really neat—so much so that it seems to attract a crowd wherever it goes. I've had more "non-R/C" people ask me about this truck than about anything else I've built in recent memory. Which way's the jungle?

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

(614)231-4170



Sanyo 1700SCRC-SP

20 Amp 0.9V Cutoff
3Cell Packs Loose Cells Min 1.13 AvgV

350+ \$34.95
360+ \$44.95

MATCHED AND LABELED ASSEMBLED
1700SCRC-SP STICK PACKS \$39.95

Sanyo 1400SCR 6 Cell

290+ \$29.95 MATCHED AND LABELED
ASSEMBLED STICK \$24.95



ESP 24D STOCK MOTORS

LAYDOWN BRUSHES

EL901 - Silver can, split rotor armature and 5.0 magnets..... **\$19.95**

EL904 - Green can, tri rotor armature and 5.1 magnets..... **\$19.95**

Wizard's Choice Team Stock Motors

Select 24D stock motors with polished bushings, diamond trued commutator, and cut silver brushes. Fully run in and Tdyno tuned for a high performance bolt in winner. Limited production.

EL901T - \$24.95 EL904T - \$24.95



Elite ES Mods



Precise hand wound modified race motors. Elite ES can with 5.0 magnets and new gold plated endbell. Full can design for max power. No mass production. Built by pros. Armatures are balanced on the high end equipment.

12-15 Dbl, Tri, Quad, and Quint
Other winds available on request

Complete Motor \$40.95
Armatures \$19.95

OEM Pack Assembly

Battery matchers. ESP has a complete assembly service for you. Stifle of the art Urtitek dual pulse welding with pure nickel tabbing, shotgun tubes, 14ga silicone wire and Tamiya connector. Call or fax for job quotes.

Wizard's Choice SP's

Elite Supreme racing batteries for A-main modified racers. Proprietary cycling and matching methods. Final rated on Turbo30 at 25 amps to 5.4V. Packs range from 295 up (Pack)



Elite Products are also available from

All Elite dealers in the US, Canada and UK
ESP Direct (614) 231-4170
Stormer Racing (800) 255-7223
Sheldon's Hobbies (800) 822-1688
Cars (049) 451 11 25 UK
C. Fohse (030) 817 84 34 Germany
DEALERS - Phone direct or call ERI Distributing (914) 268-5090

Elite Speed Products

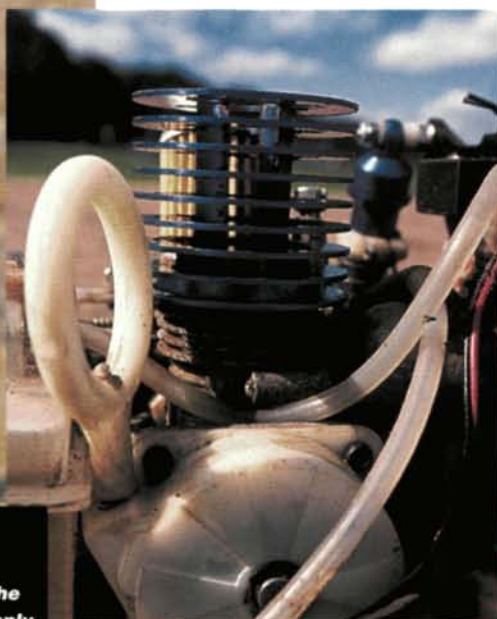
FAX (614)237-4126



Texas

TRAXXAS Nitro Buggy

by STAN VanDRUFF



The large ring on the starter rope is a nice touch compared with the older T-handle. The deeply finned head does a great job of keeping the engine cool, but it's a bear to clean when you need to change glow plugs!

GOOD THINGS COME to those who wait, right? When 1/8-scale buggies came out, I thought that I would die if I didn't get one. But they were expensive, so I waited. When gas-truck conversions came out, they were too much work for me. So I waited. The Traxxas Nitro Hawk came out (ready to run, even!), and I still waited. But when I heard rumors that Traxxas would introduce a gas buggy, I couldn't wait any longer.

THERE'S NITRO IN THE AIR

The Traxxas* Nitro Buggy isn't totally new; it's a direct descendant of the Nitro Hawk, which is a descendant of the race-proven Blue Eagle truck, which is a second cousin to the Nitro Street....

I'd like to tell you how to assemble the Nitro Buggy, but I can't. You won't need to know either, because the only way it comes is fully assembled. Just paint the body and break in the engine. You can even get the kit with a Traxxas radio, as I did. Even though the car is completely assembled, it comes with an excellent manual that shows you, step by step, how to rebuild it. Six pages are dedicated to adjusting the buggy and driving it, and the engine has its own 16-page manual.



The front suspension may look familiar; it's the same as the one on the Nitro Hawk and the Blue Eagle LS. Why doesn't every kit include genuine turnbuckles and captive rod ends like these? You can also see the beefy front brace that makes this one of the strongest aluminum tubs around.



PHOTOS BY STAN VANDRUFF & JERRY HUBERT

TRAXXAS NITRO BUGGY

STARTING STRONG

The Nitro Buggy's well-made, anodized-aluminum tub chassis has a strong front brace that can take some serious pounding. An aluminum engine mount holds the engine firmly and allows excellent heat transfer from the engine to the chassis. The rear-mounted battery holder is also aluminum for protection from the rear.

The nylon front A-arms are extra-long and strong. They're mounted on 30-degree caster blocks, but 25-degree blocks are available for high-bite tracks or enhanced low-speed steering. Traxxas' long anodized shocks are standard up front, and there are enough adjustments to suit any terrain. Upper links and tie rods come with plated-steel turnbuckles.

The rear suspension uses extra-long arms and Traxxas' extra-long anodized shocks. Turnbuckles are standard on the rear upper links, and all the ball ends (front and rear) are designed so they won't pop off in a crash. This kit is full of these little goodies that are only options with other kits.

GETTING STRONGER

Traxxas makes its own engine called the "Image 12." In the year and a half since the Nitro Hawk was introduced, the engine has been steadily refined. New rods are much stronger than the original ones, and with its oversize heat sink, the latest Image 12 really keeps its cool. In fact, it's now so tough that it's perfect for first-time gassers. Later on, add a tuned pipe, make a few modifications, and you'll have a real screamer!

The engine sits sideways, just in front of the rear bulkhead. A pair of chassis cutouts allows the engine to sit lower for improved handling, but its tall finned head and air cleaner are fully exposed to fresh air. Mounted on the crankshaft is the clutch, which doubles as the brake drum. The brake is the only disappointing part of the Nitro Buggy. It's a rather flimsy nylon affair that could never be called high-tech.

HOW DO YOU STOP THIS CRAZY THING?

A nylon split ring clamps to the crankcase, and a long pan-head bolt acts as a pivot for the brake band. For the first 15 minutes or so that I ran the Nitro Buggy, it stalled every time I touched the

SPECIFICATIONS

ManufacturerTraxxas
TypeOff-road gas buggy
Scale1/10
Suggested retail price ...\$485; w/radio \$585

DIMENSIONS

Overall length16.5 in.
Width9.75 in.
Wheelbase10.8 in.
Front track8.8 in.
Rear track8.125 in.

WEIGHT

Gross (with fuel and electronics)3 lb., 12.5 oz.

BODY

TypeOpen cockpit buggy
MaterialPolycarbonate

CHASSIS

TypeTub w/front brace
MaterialStamped aluminum

DRIVE TRAIN

TypeGear
PrimaryClutch bell/pinion gear/spur gear
TransmissionThree-gear (output ratio of 2.72)

DifferentialPlanetary gear
Bearings/bushingsTwo bearings in tranny; Oilite bushings throughout

SUSPENSION

F/R: TypeLower A-arm, upper adjustable link
DampingOil-filled, coil-over shocks

WHEELS

Type (F/R):One-piece "dish"
Dimensions (DxW):
Front2.1x705 in.
Rear2.0x1.50 in.

TIRES

FrontRibbed
RearMini-pin

POWERPLANT

EngineTraxxas Image 12
CarbRotating valve

OPTIONS TESTED

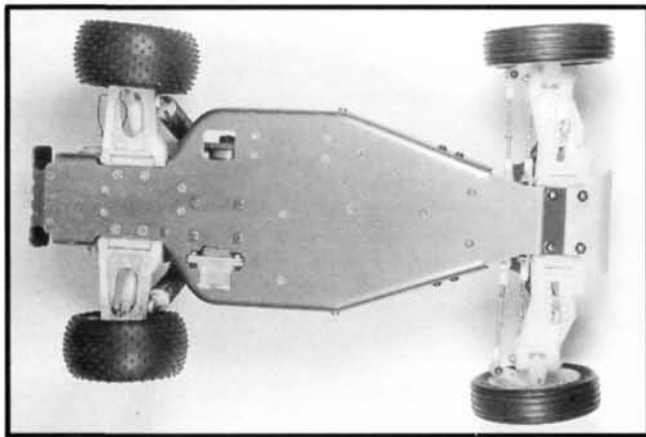
Ball bearings in front and rear axles, Traxxas AM radio and servos, Horizon Blue Thunder fuel (20 percent), McDaniel R/C Ni-starter.

HITS

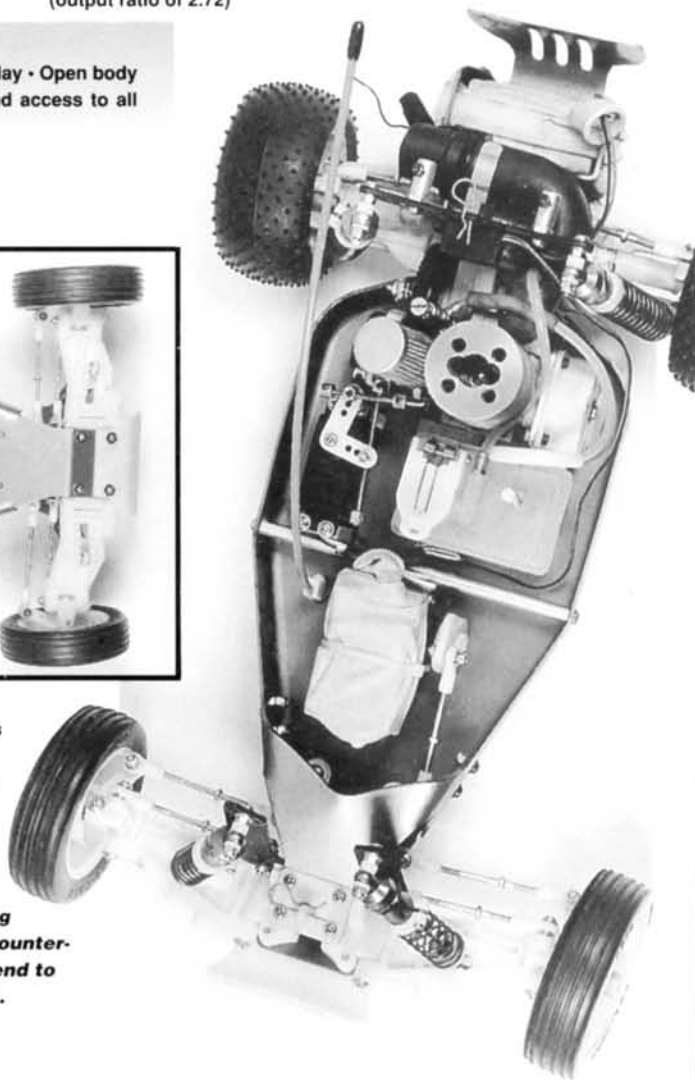
• Ready to run means you don't have to wait to play • Open body means good cooling, and it allows refueling and access to all adjustments without removing the body.

MISSES

• Wimpy brakes • Uninspiring radio.



The tub chassis has cutouts so that the engine can sit closer to the ground for improved handling. The engine-mounting screws aren't counter-sunk, so they tend to catch on things.

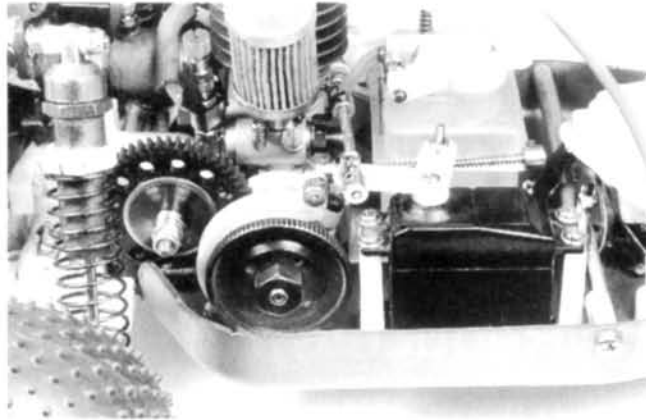


TRAXXAS NITRO BUGGY

brake. There was so much flex in the system that the pan-head screw hit the flywheel whenever I braked. Eventually I managed to adjust it so that it didn't interfere, but the first time I pulled the motor out of the chassis, I countersunk the hole in the brake band by drilling it to keep the bolt head from getting too close to the flywheel.

A slipper is mandatory on a gas off-road buggy or truck to protect the transmission from hard landings. Unlike electric motors, gas engines develop maximum torque at high rpm. If you didn't have a slipper and repeatedly landed with the throttle on, the engine would quickly rip the gears out of the transmission. The Traxxas unit works smoothly and is trouble-free.

The transmission is a compact three-gear unit with 48-pitch gears. The output gear houses the differential with its metal planetary gears. Although a planetary diff might



Here you can see the very effective slipper (on the large spur gear) and the less effective brake. The brake is a slippery nylon "band" that wraps around the clutch bell. As adjusted from the factory, it rubbed on the slipper nut at full throttle.

open cockpit with a separate nylon roll cage. The engine sits where the driver would be and gets all the air it needs. You can refuel, adjust the mixture and start the

The radio that comes with the kit (if you go that route) is a no-frills AM model that worked fine during testing, but I experienced glitching when the receiver batteries ran low. To its credit, the transmitter is one of the few available that can be converted for left-handed users.

Even though the electronics are installed, you'll have to remove the receiver and the

battery holder and put them in balloons to protect them from fuel. You'll especially want to do this with the receiver batteries, because they're right behind the exhaust outlet. After you've squeezed a few sets of batteries into a tight-necked balloon, you'll be ready to build a ship in a bottle.

The Nitro Buggy is as ready to run as any nitro buggy can be. If you buy the kit that includes a radio, you really don't have to do anything to the buggy. But you're not really ready to run until you get some goodies from the hobby store. It has been years since I played with nitro, so I was amazed when I saw the cash register total for the odds and ends I needed before going to the track.

Are you ready to run?

Obviously you need fuel. A half gallon of Horizon* Blue Thunder 20-percent nitro set me back \$15. The dealer insisted that I also needed a miniature jug of fuel additive for \$7.95. I looked at a half dozen glow starters and chose a McDaniel R/C* model 101 Ni-starter for \$31. (I'm happy with this one, but if I had it to do over, I would pay the extra \$6 and get the model with a built-in voltmeter.)

Five more dollars bought a rebuild kit for my aged fuel pump, and I lost track of how much the 12 AA alkalines cost. On my next trip to the store, I bought a couple of glow plugs, after-run oil and a spare air filter.

Even if a car is "ready to run," you (or your parents) should be prepared to spend an extra \$50 to \$60 if it is your first nitro car. Also, make sure that you have everything you need when you leave the hobby store. I'd feel pretty silly if I got a ready-to-run buggy and then made two trips to the hobby store before I got to run it!

not seem as cool as a ball diff, this Traxxas unit has proven to be ridiculously tough in the Nitro Hawk. It never has to be adjusted, and it can't experience nuclear meltdown like a poorly adjusted ball diff. But if you want a ball diff, rest assured that one is available.

AND GOOD LOOKS, TOO

The Traxxas body reminds me of the early days of R/C off-road, when buggies resembled full-size cars. The Nitro Buggy has an

engine without removing the body. The only time you need to remove the body is when you replace the radio batteries.

Removing the body can be a pain because you need a tiny Allen wrench to take the wing off. Once I started the engine without the wing, and the setscrews vibrated loose; they were invisible in the grass (when will I learn?). I replaced them with a pair of 1/2-inch-long 4-40 Phillips-head screws that stick through the body. Now the wing is much easier to deal with.

BREAKING IT IN

I wouldn't take anything for my Nitro Buggy (well, maybe a Ferrari), but a gas buggy is a little more work than an electric one. The first big difference is apparent when you break in the engine. The instructions explain the process in such great detail that it could scare you. The important thing to remember is to run the engine rich for the first three tanks of fuel, and then gradually lean it out over another three or four tanks. Running rich allows extra fuel and lubricant to keep the engine cool and carry away microscopic metal particles.

If the Nitro Buggy is your first gas car, breaking in the engine will be exciting. Even when you run it rich for the first few tanks, the Nitro Buggy is faster than most electric buggies, and it will get your blood pumping. As the engine loosens up and you start leaning the mixture, it starts running faster and faster. By the time you've put seven or eight tanks of gas through the Image 12, you'll be irreversibly hooked on nitro!

I can write all day about how the Nitro Buggy is built or what it's made of, but I want you to know that the Nitro Buggy is fun! It's fast and as agile as a cat. I ran it on a parking lot, drove it in the woods and took it to the beach. It handled everything beautifully. Its distinctive nitro sound drew admiring looks wherever I took it. When you're ready to give gas a try, the Nitro Buggy is a great way to go!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.



NORRCA OFF-ROAD

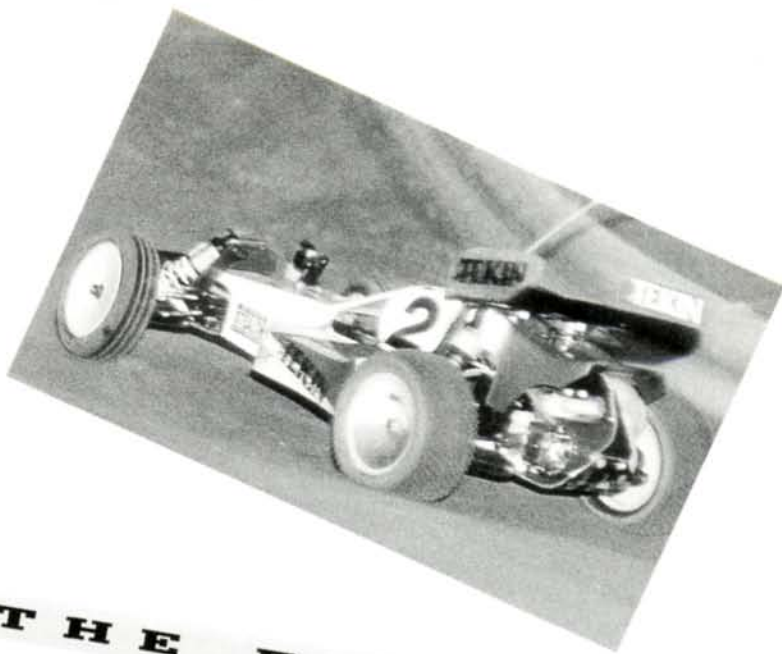


THE TWO THINGS I remember most about last year's NORRCA Off-Road Nationals were the intense heat and the intense racing action. At the '94 NORRCA Off-Road Nats (June 17 to 19), the weather and the racing action were hotter than ever. This year's event was hosted by Radio Control Race Course (RCRC) in Oklahoma City,

OK. Track/pro-shop owners Steve De Armon and Rick Yarber did an excellent job of hosting the event. A vacant industrial facility next door was leased to give the contestants ample room to pit. The track was equipped with a fully stocked pro shop, a concession stand and an indoor, fast racetrack.

b y G e o r g e G o n z a l e z

NATS



This year's event attracted more than 400 contestants from all over the country, and many of the best drivers in the world were present to compete for the coveted title of national champion. The factory teams—Team Associated and Team Losi—were also there for the Seventh Annual Team Cup Challenge.

A-MAIN ACTION

• **Expert 2WD stock class.** The expert 2WD stock class led things off and gave way to some close racing action. With a first-, a second- and a third-place finish totaling 199 points, Chris White found himself tied for the national championship with top-qualifier Barry Baker, who was ahead in points after the first two Mains. Baker's bad start in the A3 Main, however, put him in fifth place and foiled his chances for the national title. White won the expert 2WD stock national championship by a tie-breaker, and Baker placed second. Jeff Masse took third with a total of 196 points.

• **Expert 2WD modified.** Top-qualifier Chris White literally ran away with the expert 2WD modified national championship by piloting his Team Losi Double-X to victory. With two first-place finishes totaling a perfect 200 points in the first two Mains, there was no need for him to race in the A3 Main. Josh Hughes took second with his two second-place finishes—198 points. Rounding up third was Matt Lee with 197 points.

• **Expert truck stock.** No doubt, Jimmy Babcock had the expert stock truck national championship in his sights; with two first-place finishes totaling 200 points, he proved that his Team Losi LX-T has what it takes to TQ and win a national championship. Close

behind was Matt Lee's Team Associated RC-10T, which finished second with 199 points. Alexander Chavez drove his LX-T to a third-place finish with 198 points.

• **Expert truck modified.** Chris White once again returned to the limelight with yet another national championship by piloting his Peak Performance-powered LX-T to victory. After two straight first-place finishes totaling 200 points, he once again earned the honor of not having to show up for the A3 Main (besides, the swimming pool was calling his name). Brian Dunbar was a close second with a first-, a second- and a third-place finish,

which totaled 199 points. Darrin Jendreas rounded up third with 196 points.

• **Expert 4WD modified.** Top-qualifier Mark Pavidis was the man to beat in the expert 4WD modified class, but Matt Ledger, with two first-place finishes and one second-place finish totaling 200 points, stole the national championship. Mark came in second with 199 points. Jeff Wittman piloted his Schumacher Cat 2000 to a third-place victory with 196 points. To everyone's surprise, expert 4WD modified national champion Brian Kinwald chose not to compete in the event.

THE EVENTS

- 2WD Stock
- Stock Truck
- 2WD Modified
- Modified Truck
- Expert 2WD Stock
- Expert Stock Truck
- Expert 2WD Modified
- Expert Modified Truck
- Factory 2WD Modified
- Factory Modified Truck
- Expert 4WD Modified

With 11 racing classes—and four rounds of qualifying in each—you can bet your paycheck that there was a lot of racing going on! If that wasn't enough, the expert and factory drivers were faced with triple A-Mains in which points were accumulated according to their finishing position (first = 100 points, second = 99 points, third = 98 points, etc.). The driver's worst score was tossed and only used as a tie-breaker.

Although the first rounds of qualifying were on Friday, most of the drivers arrived days before to get in their fair share of practice before the event. The concours event started things off on Saturday, and with so many radical cars and trucks, I'm sure it was a trying job to pick just three. The first-place trophy went to Sonny Nave for his totally decked-out "Tasmanian Devil" LX-T. Second-place winner Dave Hassett stunned the judges with his awesome-looking RC10T, which he calls "Nuclear Meltdown." Third place went to Alex Chaves for his radical-looking LX-T (Alex placed third in the expert stock truck A-Main with the very same truck.)

EXPERT 2WD STOCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	2	Chris White	Double-X	Peak Performance	Orion	410-HPC	Airtronics	Jammin'	Losi
2	1	Barry Baker	RC-10W	Reedy Mach 2	Reedy Ultra	410-HPC	KO EX-1	RCPS Mirage	Pro-Line
3	8	Jeff Masse	Double-X	Peak Performance	Orion	410-K	KO EX-10	Jammin'	Losi
4	4	David Hill	RC-10W	—	Badd Boyz	411G2	Airtronics	Associated	Pro-Line
5	3	Jason Cordell	Double-X	Precision	Sanyo	Novak	Airtronics	Jammin'	Losi
6	10	Jimmy Babcock	Double-X	Tomahawk	Ballistic	410-HPC	Airtronics	Jammin'	Losi/Pro-Line
7	5	Frosty St.Clair	RC-10	—	Reedy	Novak	Airtronics	RCPS Mirage	Pro-Line
8	6	Boe Bergeson	Double-X	Lightspeed	Orion	Novak	JR-756	Jammin'	Losi
9	9	Jordan Musser	RC-10	Extreme	World Class	410-K	KO EX-10	Mirage	Losi
10	7	Jody Spillman	—	—	—	—	—	—	—

EXPERT 2WD MODIFIED

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Chris White	Double-X	Peak Performance	Orion	410-HPC	Airtronics	Jammin'	Losi
2	3	Josh Hughes	—	—	—	—	—	—	—
3	6	Matt Lee	Double-X	Badd Boyz	Badd Boyz	411-G2	Airtronics	Jammin'	Losi/Pro-Line
4	2	Richard Saxon	RC-10	Reedy	Reedy	Tekin	Airtronics	RCPS Mirage	Pro-Line
5	5	Jason Cordell	Double-X	Precision	Sanyo	Novak	Airtronics	Jammin'	Losi
6	9	Mason Marks	RC-10	Extreme	World Class	410-HPC	Airtronics	RCPS Mirage	Losi/Pro-Line
7	10	Glen Bean	RC-10W	Specialized	Power Prod.	411-G2	Airtronics	RCPS Mirage	Losi/Pro-Line
8	8	Jimmy Babcock	Double-X	Tomahawk	Ballistic	410-HPC	Airtronics	Jammin'	Losi/Pro-Line
9	7	Jack Leighan	Double-X	Ballistic	Orion	410-HPC	Airtronics	Jammin'	Losi
10	4	Jeff Masse	Double-X	Peak Performance	Orion	410-K	KO EX-10	Jammin'	Losi

EXPERT TRUCK STOCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Jimmy Babcock	LX-T	Tomahawk	Ballistic	410-HPC	Airtronics	Losi	Losi/Pro-Line
2	2	Matt Lee	RC-10T	Badd Boyz	Badd Boyz	411-G2	Airtronics	Associated	Pro-Line/Losi
3	5	Alex Chavez	LX-T	Peak Performance	Orion	411P	Futaba	LX-T	Losi/Pro-Line
4	3	Jason Ashton	LX-T	Race Prep	MC2	410-HPC	Airtronics	Losi	Losi
5	8	Todd Freimiller	LX-T	Genesis	Genesis	M1-C	Airtronics	Losi	Losi
6	10	Paul Schwander	LX-T	Quarter-Flash	World Class	Novak	Airtronics	NA	Losi/Pro-Line
7	7	Chuck Ericson	LS-II	Extreme	Nuclear	411-G2	KO EX-1	Traxxas	Losi
8	9	Reese Dennis	RC-10T	Tomahawk	Ballistic	M1-C	Airtronics	Associated	Losi/Pro-Line
9	6	Mason Marks	RC-10T	Extreme	World Class	410-HPC	Airtronics	RCPS Mirage	Pro-Line
10	4	Chris Stahl	Storm 2000	Badd Boyz	Badd Boyz	411-G2	Airtronics	LS-II	Losi

EXPERT TRUCK MOD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Chris White	LX-T	Peak Performance	Orion	410-HPC	Airtronics	Losi	Losi
2	2	Brian Dunbar	LX-T	Trinity	Trinity	Novak	KO Propo	Losi	Pro-Line/Losi
3	9	Darrin Jendreas	LX-T	Perfect Wound	Perfect Match	410-HPC	JR-756	Losi	Losi
4	5	Richard Saxon	RC-10	Reedy	Reedy	Airtronics	Airtronics	RCPS Mirage	Pro-Line
5	4	Matt Lee	RC-10T	Badd Boyz	Badd Boyz	411-G2	Airtronics	Associated	Pro-Line/Losi
6	6	Jimmy Babcock	LX-T	Tomahawk	Ballistic	410-HPC	Airtronics	Losi	Losi/Pro-Line
7	10	Jade Kurtchi	Traxxas	Extreme	World Class	411-G2	Airtronics	Traxxas	Losi
8	3	Gary Stedt	LX-T	Perfect Wound	Perfect Match	411-G2	KO EX-1	Losi	Losi
9	7	Patrick McCarron	LX-T	Precision	Badd Boyz	411-G2	Airtronics	Losi	Losi
10	8	Paul Schwander	LX-T	Quarter-Flash	World Class	Novak	Airtronics	NA	Losi/Pro-Line

EXPERT 4WD MOD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	2	Matt Ledger	Yokomo	Reedy	Reedy	Novak	JR Propo	Yokomo	Pro-Line
2	1	Mark Pavidis	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line
3	5	Jeff Whitman	Schumacher	Matrix	Double Strike	Tekin	Airtronics	Schumacher	Pro-Line
4	3	Carlos Gonzalez	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line
5	8	Kurt Wenger	—	—	—	—	—	—	—
6	4	Scott Roberts	Yokomo	Peak Performance	Team Orion	Novak	JR Propo	Yokomo	Losi
7	7	Patrick McCarron	Schumacher	Precision	Badd Boyz	Tekin	Airtronics	Schumacher	Pro-Line/Losi
8	6	Jack Leighan	Yokomo	Ballistic	Orion	Novak	Airtronics	Yokomo	Pro-Line/Losi
9	9	Steve DeArmon	Schumacher	Badd Boyz	Badd Boyz	Novak	Airtronics	Schumacher	Schumacher
10	10	Chris Stahl	Schumacher	Badd Boyz	Badd Boyz	Tekin	Airtronics	Schumacher	Schumacher

FACTORY 2WD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	1	Brian Kinwald	Double-X	Trinity	Trinity	Novak	Airtronics	Jammin'	Losi
2	5	Matt Francis	RC-10	Reedy	Reedy	Novak	Airtronics	RCPS	Pro-Line
3	2	Mark Pavidis	RC-10	Reedy	Reedy	Novak	Airtronics	RCPS	Pro-Line
4	4	Carlos Gonzalez	RC-10	Reedy	Reedy	Novak	Airtronics	RCPS	Pro-Line
5	6	Jason Ruona	RC-10	Reedy	Reedy	Novak	Airtronics	RCPS	Pro-Line
6	8	Jack Johnson	Double-X	Peak Performance	Orion	Novak	JR Propo	Jammin'	Losi
7	7	Greg Hodapp	RC-10	Reedy	Reedy	Novak	Airtronics	RCPS	Losi/Pro-Line
8	3	Scott Brown	Double-X	Peak Performance	Orion	Novak	JR Propo	Jammin'	Losi
9	10	Jay Halsey	Double-X	Trinity	Trinity	Novak	Airtronics	Jammin'	Losi
10	9	Scott Roberts	Double-X	Peak Performance	Orion	Novak	JR Propo	Losi	Losi

FACTORY TRUCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	3	Brian Kinwald	Double-X	Trinity	Trinity	Novak	Airtronics	Losi	Losi
2	2	Carlos Gonzalez	RC-10T	Reedy	Reedy	Novak	Airtronics	Associated	Pro-Line
3	5	Scott Hughes	RC-10T	Reedy	Reedy	Novak	Futaba	Associated	Pro-Line
4	1	Mark Pavidis	RC-10T	Reedy	Reedy	Novak	Airtronics	Associated	Pro-Line
5	9	Matt Francis	RC-10T	Reedy	Reedy	Novak	Airtronics	Associated	Pro-Line
6	10	Mark Francis	RC-10T	Reedy	Reedy	Novak	Airtronics	Associated	Pro-Line
7	6	Derek Furutani	RC-10T	Reedy	Reedy	Novak	Airtronics	Associated	Pro-Line
8	8	Quincy Hughes	RC-10T	Lightspeed	Lightspeed	Novak	JR Propo	Associated	Pro-Line
9	4	Jack Johnson	Double-X	Peak Performance	Orion	Novak	JR Propo	Losi	Losi
10	7	Scott Brown	LX-T	Peak Performance	Orion	Novak	JR Propo	Losi	Losi



The First Annual

CANNONBALL Challenge

By midday, the qualifying heats were almost half over, and the temperature was well above 100 degrees. It was so hot that many of the drivers, including me, were making frequent visits to the hotel swimming pool to cool off. The Best Western Saddleback Inn was a stone's throw away, and it became almost too convenient, if you get my drift.

Team Associated drivers Matt Francis and Derek Furutani were goofing off by the pool when they spotted me nearby with my camera and 400mm assault lens. Before I knew it, they started doing cannonballs and splashed water all over me. This gave me a grand idea, and both Matt and Derek became my accomplices. The two Team Associated drivers and would-be cannonball finalists challenged some of the Team Losi drivers to a cannonball competition (the losers would have to streak down a main boulevard in Oklahoma City—just kidding). Unfortunately a sudden rainstorm foiled our plans, but the challenge is still on for next year's NORRCA Nats, so start eating those Hostess Ding-Dongs.

• **Factory 2WD.** The factory 2WD modified class was one of the most exciting events at the '94 NORRCA Nats. Both Matt Francis and Mark Pavidis were deadlocked for first place, while TQ—and IFMAR world champion—Brian Kinwald was in second after the first two Mains. After a major turn-two scrimmage in the A3 Main, Brian Kinwald found himself with a half a track lead over the rest of the pack, and he never looked back. Brian emerged victorious with 199 points and the factory 2WD national championship. After the A3 Main was over, both Matt and Mark were deadlocked for second with 198 points each. Mark Pavidis took second after the tie-breaking heat was factored in, while Matt Francis finished third.

• **Factory truck modified.** The factory-modified truck class had the hundreds of spectators and racers on their feet the whole time as their cheers drowned out the announcer's voice. With his two first-place finishes and one second-place finish, Brian Kinwald drove his Double-XT prototype to a well-deserved victory with a total of 200 points. Carlos Gonzales piloted his modified RC10 Team Truck to a second-place victory with 197 points. Rounding up third was Scott Hughes with 195 points. Top-qualifier Mark Pavidis was shuffled out of the grid in



The great "Kinwald" readies his Double-XT for its next race.

both the A1 and A3 Mains, so his first-place finish in the A2 Main didn't help matters much.

SEVENTH ANNUAL TEAM CUP CHALLENGE

Team Associated earned 621 points and was declared the winner of the Seventh Annual Team Cup Challenge. Team Losi came in second with 581 points after two of their drivers didn't make the A-main. Unfortunately, Team Traxxas wasn't represented at this year's event.

The '94 NORRCA Off-Road Nats was a

Double-XT and new RC10 Team Truck make their debut

Most of the Team Losi drivers were driving new Double-X trucks (unofficially called the Double-XT). The new truck will have many of the same features found on the Double-X buggy, i.e., a modular design and a low-CG chassis, plus many new features that include redesigned steering and a front suspension system with perfect geometry, super-long A-arms, extremely offset front wheels, a totally awesome racing truck body and, of course, the new Double-X tranny equipped with a Hydra Drive system. The Team Losi drivers were also experimenting with new composite materials for many of the truck's major suspension parts, but news of these parts becoming available is highly speculative. Overall, the prototype truck worked extremely well; in the hands of Trinity/Team Losi factory-driver Brian Kinwald, the Double-XT won the factory-modified truck national championship its first time out.

Some of the Team Associated drivers were also experimenting with a new prototype truck based on the eagerly awaited Worlds Car. Although news of its release is unknown at this time, the truck had many of the Worlds Car's new features plus a Stealth tranny with a lower final gear ratio. Team Associated factory-driver Mark Pavidis was the top qualifier of the factory-modified truck class, and he posted the fastest time of the event (14/4.02:74).

huge success. Congratulations to Team Associated and all the 1994 national champions. The folks at RCRC should also be congratulated for doing a fine job of hosting the event.

I look forward to covering the next NORRCA Off-Road Nats, and don't forget about the First Annual Cannonball Challenge; I'll be ready next year with waterproof camera gear! ■



SINCE I FIRST reviewed the MRC* Desert Thunder (*Car Action*, August '93), I've bashed, crashed and thrashed this buggy more than any other car in my arsenal and, after a year of serious abuse, the only damage has been a broken tranny case. This is quite a testimony, considering the way I drive, so believe me when I say that the Desert Thunder is one tough customer. So why mess with such an impressive vehicle? Because it's fun!

CODE NAME:

PROJECT DESERT

by GEORGE GONZALEZ

How
fast
can
you
make
it
go?

ROCKING THE FOUNDATION

I wanted the lightest chassis possible without sacrificing strength and rigidity, so I called Dave Inkel at DA Graphite*. The DA Graphite World Scale chassis is extremely narrow for its length. In fact, it looks more like a Formula 1 chassis than an off-road chassis. It has a three-tier design. The front bulkhead, the battery and the tranny all rest on an extremely narrow, rigid, 0.85-inch graphite sub-chassis that was designed to lower the center of gravity.

The main chassis is slightly wider than the sub-chassis, and it houses the steering bellcranks, the steering servo and the rear A-arm mounts. It's as thick as the sub-chassis, but it's made of a different grade of graphite. It provides the strength, and the sub-chassis adds to the rigidity.

The third level of the chassis is a graphite upper deck that replaces the original aluminum unit. The upper deck is a solid plate—unlike the original hollow brace—that's made of the same lightweight material as that of the main chassis. It stiffens the front end—allowing the suspension to do its job—and supports the front bulkhead and the steering bellcranks. Dave included a graphite motor-mounting plate and a graphite tranny brace that doubles as an ESC/receiver tray. Overall, the DA Graphite World Scale chassis is a whopping 5 ounces lighter than the original one, and it's far more rigid.



When it came time to decide which motor I would run in my beast, I opted for an Aveox brushless motor; it has gobs of power! Dave Palombo of Aveox Motors (right) helped me to set it up in the chassis correctly.

PRO FRONT END

I outfitted the Thunder's original front shocks with a set of A&L* shock limiters (part no. 7203). The shocks are mounted on an A&L Pro front shock tower (part no. 2015) that's made of durable, 1/8-inch-thick fiberglass; it has many shock and camber-link mounting holes for a broad range of adjustments.

To reduce weight and increase strength, I installed an A&L Upper Control Arm Kit (part no. 7202), and to improve steering response, I added the Steering Enhancement kit (part no. 7201). It comes with a set of fiberglass servo-saver stiffeners that



Thunder

beef up the steering system. An adjustable titanium center link replaces the stock unit, and a set of tight-fitting ball ends removes all the slop from the steering system.

REAR-END ENHANCEMENTS

I hooked up the rear end with many of the enhancements I used on the front end: A&L shock limiters; one-hole shock pistons; 50WT shock fluid; and an A&L Pro rear shock tower (part no. 2014). A set of A&L titanium turnbuckles and tighter-fitting ball ends round out the rear-suspension enhancements.

I broke out my Dremel and removed more than half the material on the Thunder's stock plastic body-mount bulkhead, and it was just as secure as before.

TRICK TRANNY TRICKS

While rebuilding the tranny, I put a light coat of Associated* Stealth Lube on the diff gear before I installed the Thunder's

12 diff balls. Before I assembled the diff, I put some Associated black grease on the thrust-washer bearing. The diff is now ultra-smooth, and it can be set tighter without locking up.

I decided to try A&L's spur-gear adapter kit (part no. 7200), which allows you to use standard, 48-pitch spur gears; not only does this give you a wider choice of gear ratios, but it also reduces rotating mass owing to its lightweight design. The kit includes a set of aluminum motor spacers; these aid in gear alignment and act as heat sinks.

The last tranny modification I made was to install a lightweight A&L Lexan gear cover (part no. 9033). It weighs two-thirds less than the stock unit; it has a slipper-clutch adjustment hole for easy slipper access; and it's clear for easy monitoring.



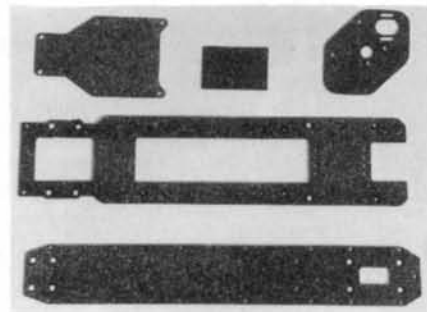
As you can see, my Project Desert Thunder is much slimmer and trimmer than the stock version, and it's twice as fast!

INSANE POWER

The juice for my project car is provided by 12 Orion* 1700mAh Sanyo SCRC cells. (I made a two-story battery pack with seven cells on the bottom and five on the top.) I

DESERT THUNDER

used battery bars and wired the cells in parallel for maximum power. The battery pack rests in its own compartment in the

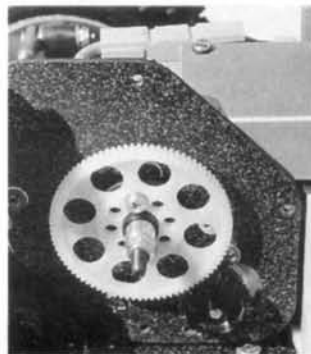
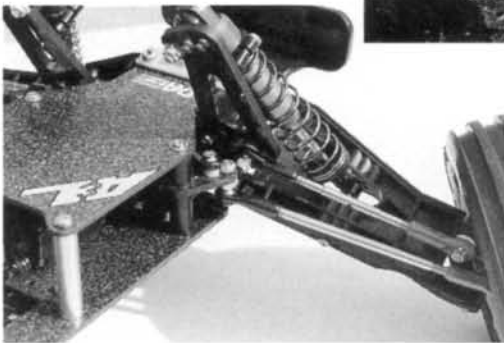


DA Graphite's World Scale chassis comes with a two-piece lower chassis, a front steering assembly upper stiffener and a tranny brace/speed-controller plate. By adding the DA chassis, you save almost half a pound.

multi-level chassis; I secured the pack with a set of battery straps.

Awesome horsepower is supplied by a state-of-the-art, microprocessor-controlled, brushless motor and speed-control system by Aveox*.

Above: an A&L shock tower, shock limiters and a steering-enhancement kit with titanium turnbuckles bulletproofs the front end. Left: I equipped my project car with a Robinson Racing 81-tooth, 48-pitch Stealth Silencer spur gear and a Robinson 35-tooth pinion gear. With the 12 Orion 1700 SCRC cells, I got a run time of about 8 minutes.



few maneuvers to get my trims in order; then I blasted off. My project car felt extremely light and nimble, and the air time was endless. I did notice that the braking system on

the brushless motor isn't proportional as on standard brush motors, and when you apply the brakes—no matter how lightly—the tires lock up. This took a little getting used to, but in the long run, it suited my driving style just fine. After about 15 laps, the batteries started to dump, and I clocked an 8-minute run time.

My project car was considerably faster than the fastest gas car I've

driven, and thanks to its longer wheelbase and super-wide track, it even seemed to handle better. The best part is that the run time will keep me out on the track just as long as some gas cars. Hope to share the same dirt sometime!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

TRACK TIME

An Aveox brushless motor has more than three times the torque of a standard brush motor, so it requires an extremely high gear ratio. I installed a Robinson Racing* 81-tooth, 48-pitch, Stealth Silencer spur gear and a 35-tooth pinion gear.

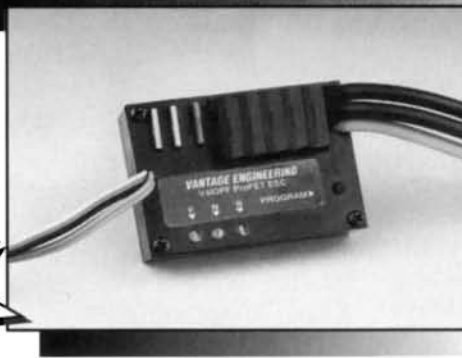
I set the car on the track and performed a

High Performance Speed Controller

The V410PF is the first breakthrough since high frequency switching. Microprocessor design combined with new larger FETS and a new approach to torque control yield the fastest, easiest to operate controller yet.

- Ultra-low resistance PROFETS™ reduce typical power loss by 33% compared to other ESC's
- Microprocessor based design — All programmed functions are stored in nonvolatile memory
- "CCTR" (Computer Controlled Throttle Response) allows programmable torque control
- High frequency design ensures smooth throttle response
- Low voltage operation eliminates receiver battery pack requirements
- Internal Schottky regeneration diode
- Resettable reverse polarity fuse
- Limited warranty

■ One Pushbutton Setup



V410PF

Multi-Function 30 Amp Dyno



Digi-Dyno 30

- Infinitely variable load to 30 amps
- Infinitely variable voltage settings to 7.2 volts
- True RPM, AMP and POWER readings
- Works with reverse rotation motors
- Slave motor and stand included
- Ideal for both stock and modified motors
- Can be used with Ni-Cad batteries
- One year limited warranty

Low Cost 25 Amp Disharger

- Maintains an average 25A load
- Powered from the pack being discharged
- Rugged aluminum case
- LED indicates end of discharge
- Light weight
- One year warranty

Model 25A



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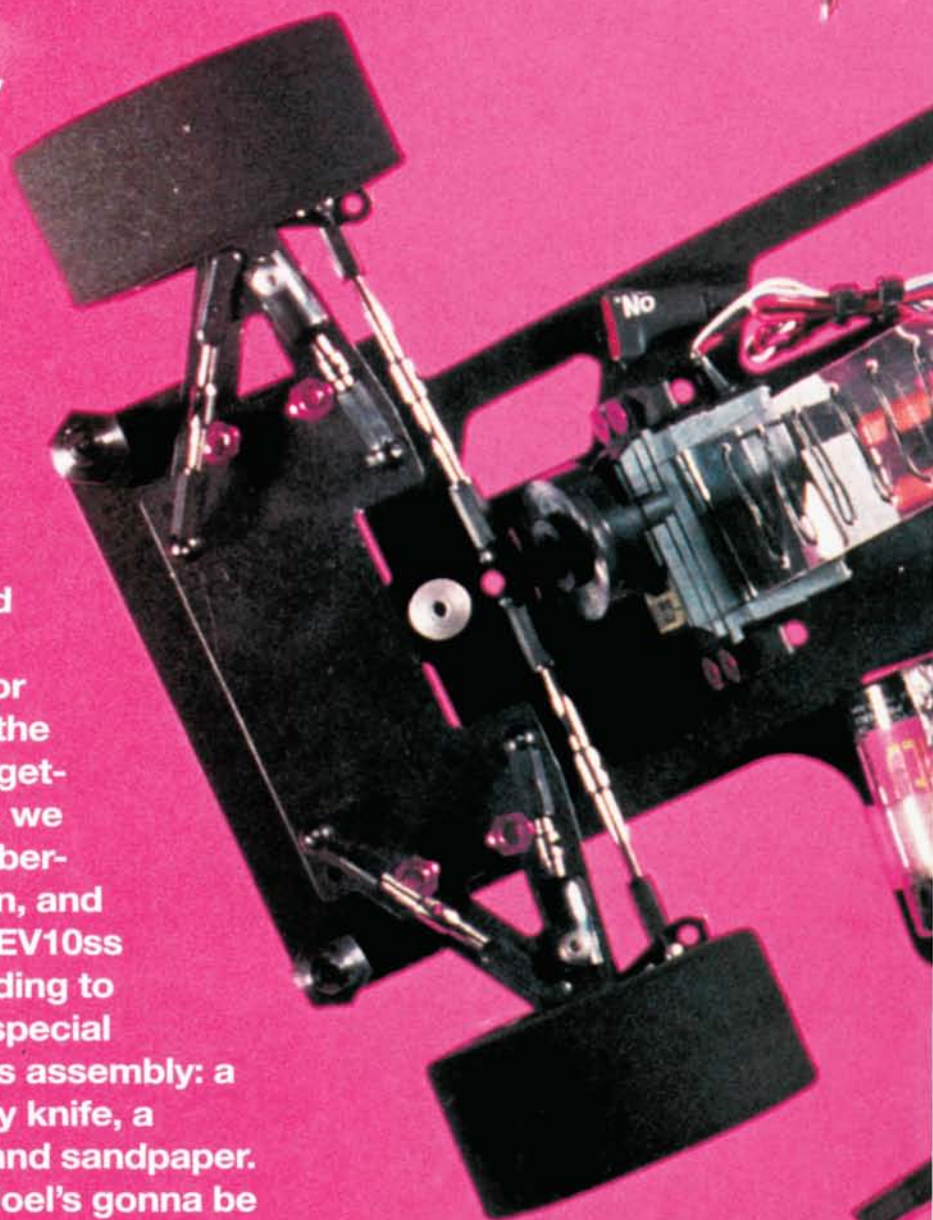
Joel Johnson's EV10ss

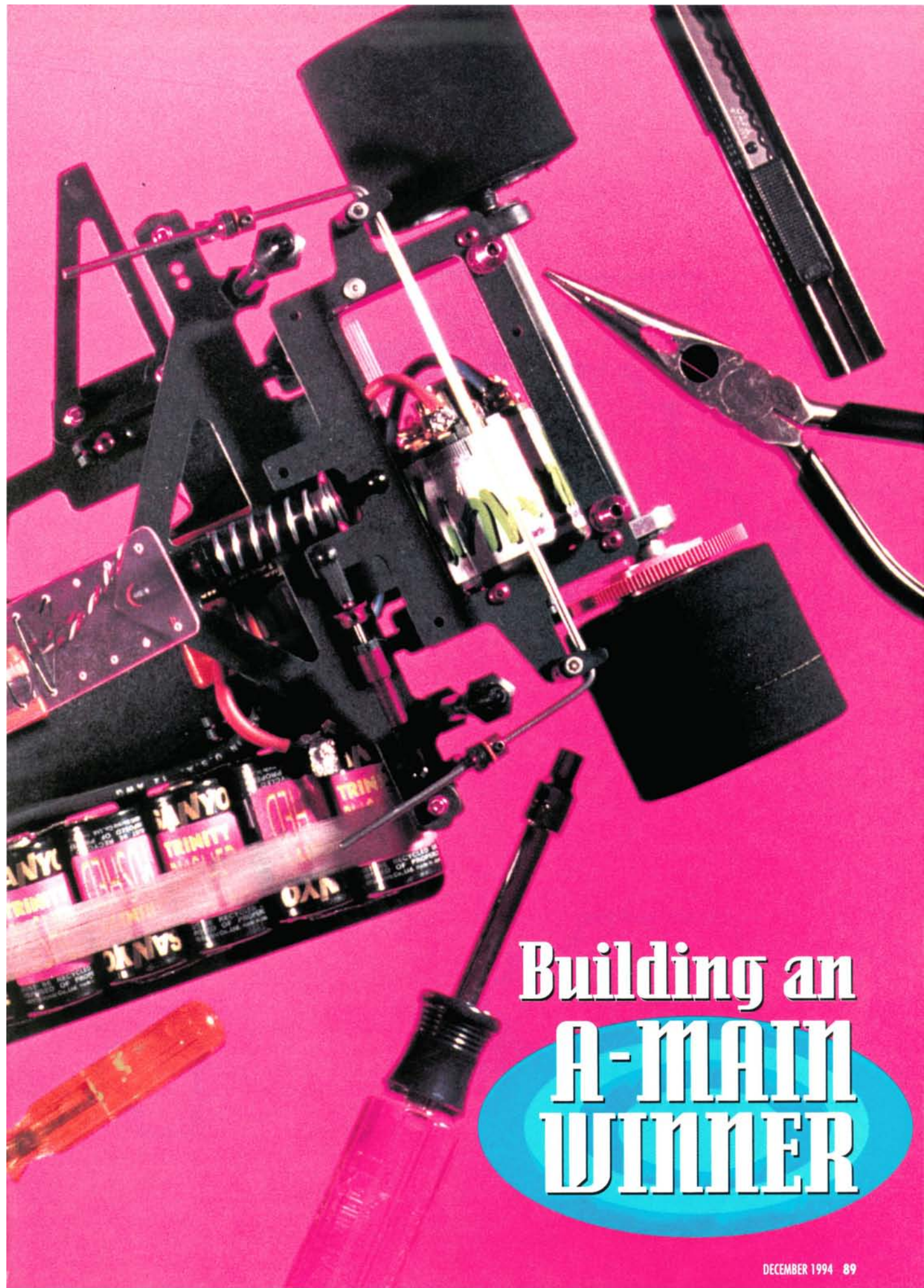
by Joel Johnson

SPEED SECRETS

THE TRINITY* EV10ss is a highly competitive racecar. In the hands of Trinity's racing team, it can win—and *has won*—on almost every major super-speedway track in the country.

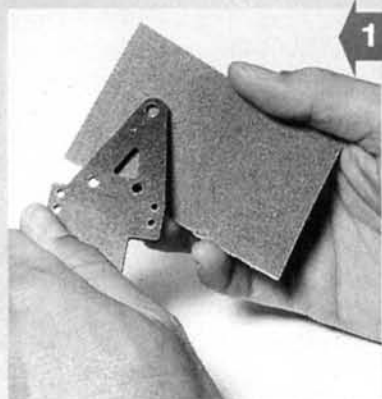
Because of its impressive winning streak and excellent overall design, we voted it the "1994 *Car Action* Car of the Year." Well, for those of you who have the car or are interested in getting your hands on one, we contacted Trinity's number-one driver, Joel Johnson, and asked him to share his EV10ss building secrets. According to Joel, you'll need a few special tools to help you with its assembly: a tapered reamer, a hobby knife, a .1265-inch reamer, CA and sandpaper. And from here on out, Joel's gonna be your pilot on this flight...enjoy!





Building an A-MAIN WINNER

JOEL JOHNSON'S EV10SS SPEED SECRETS



1 Before I start assembling the kit, I smooth the edges of all the graphite parts with 400-grit wet/dry sandpaper. I usually do it under running water, which keeps the dust down completely. This is especially important for the battery slots, which, if left sharp, can cut through the battery's heat shrink and short out the pack. Remember, graphite is conductive.

When I've sanded all the graphite parts, I lightly coat the edges of the chassis and the front end plate with thick CA to seal the graphite and prevent it from splitting on impact with a wall. This must be done very carefully and with thick CA only, because thin CA will run all over



the chassis, and you'll probably end up glued to your new car—not good! When the glue is dry, I usually go back over the edges with sandpaper to smooth the glue and to get a nice finished look. If you have the time, you can start with 400-grit, work up to 600-, 800-, etc., and almost get a mirror finish on the edges of your chassis. Be careful not to sand through the glue, but if you do, just re-coat that area and re-sand



3 With the graphite taken care of, I start assembling the front end. The first step is to relieve the hole for

5 Next, I thin out the bottom of the front-end bushings to allow more room for springs and an O-ring. To use our after-market springs—EV0104 and EV0132s—you'll have to do this, or the springs will have too much pre-load when installed. The easiest way to sand down the front bushings is to find a nice flat surface, such as glass or a smooth countertop, and place a full sheet of 360-grit sandpaper flat on that surface. Now take a bushing between your index finger and thumb and move it in a circular motion over the sandpaper while pressing down hard. Move the bushing around for a few seconds, then

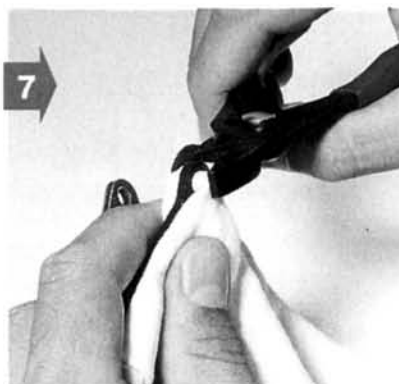


rotate it between your fingers, and then sand some more. This will prevent one side from becoming thinner than the other. Keep sanding until the bottom part of the bushing is about $\frac{1}{16}$ inch thick and even on all sides. (This should take a few minutes per bushing.)

the front-end bushing with a tapered reamer. I run the reamer from the bottom of the front end plate (you decide which is the bottom) until the front bushing snaps into place without having to be forced too hard.



After the front bushings have been taken care of, I build the front upper A-arms. I start by threading the right-hand threads of the turnbuckles into the plastic yokes. Next, I thread the ball cups onto the



a pair of pliers. (The rag protects the ball from being damaged by the pliers.)

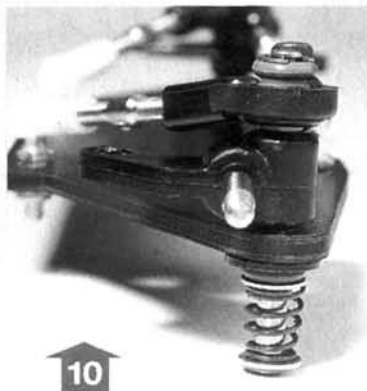
other side of the turnbuckles by the same amount. I install the upper ball in the yoke, covering the ball with a rag or towel and snapping it into place with



in the bushing lined up as close to dead center as possible. Next, I insert the kingpin into the front end and adjust the camber and caster to the settings I want.

8 When the upper A-arms are complete and the ball studs have been put into the front end plate, I snap the A-arms onto the front end for adjustment. First, I eyeball the upper A-arm to get its kingpin hole and the hole



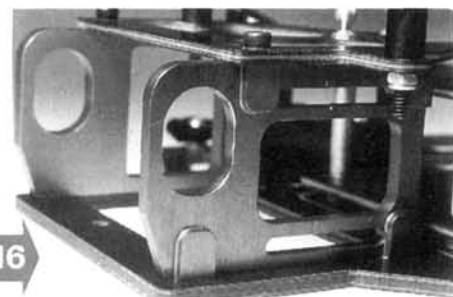


With the smooth end first, I insert a .1260-inch straight reamer from the bottom of the front end until the cutting part is in the bushing. I then rotate the reamer clockwise to relieve the hole. By using the upper A-arm as a guide, this reams the hole at just the right angle and you end up with a front end that operates smoothly. You should do this every time you alter the caster and camber settings. When the front end has been built, the spring and spindle should look like the ones shown in photo 11.

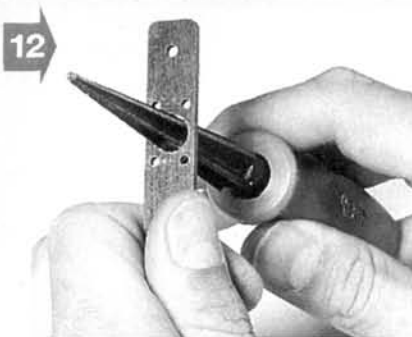


Now that the rear bearings are free, we have to make sure that they stay free—not pinched—when they're installed in the rear pod. We do this by taking some material off the part of the bearing carrier that presses the inside of the rear pod and the hole

in the rear pod. I do this with a sharp hobby knife, which I drag around the outside of the bearing carrier to remove only a little material. After doing the bearing carrier, I use the hobby knife to relieve the outermost edge of the hole that the bearing carrier presses into in the rear pod plate. (It's just like de-burring a part of a plastic model.) Having done this, you should notice a small silver stripe around the outside of the hole (if you have a purple-anodized pod plate); or you should notice that the



edge is now more beveled than it was before. If you do all this properly, the bearing carriers should pop into place with some effort and not be loose in the pod.



When assembling the rear center pivot, I like to relieve the pivot hole just as I relieved the front bushing holes. Using my tapered reamer, I slightly relieve the hole from both sides until the plastic pivot mount fits into place without being forced.

Now that we're moving toward the rear of the car, it's time to look at the rear bearing carriers. To ensure that the rear bearings spin freely, we need to get out the tapered

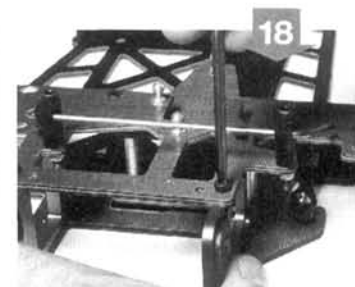
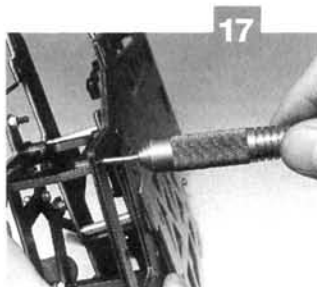


After

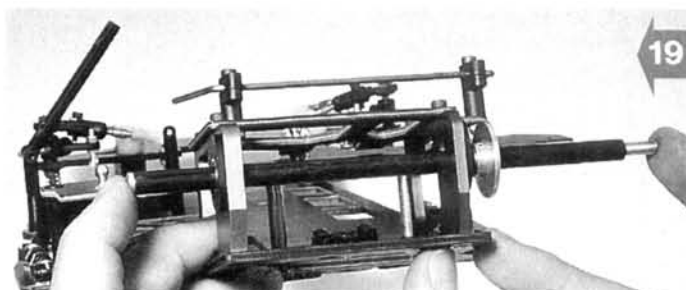


Before

reamer again. Open up the hole in the inside of the bearing carrier until you can see about half the inside of the rear bearing. Be careful not to enlarge the hole too much, or the bearing alignment might suffer.



It's time to make sure that the axle is correctly aligned. I make sure of this by inserting the axle into the rear end with the bearing carriers in place. Next, loosen the screws in the top and bottom plates by about half a turn (or until they're just slightly loose). Now tighten the screws—first in the bottom plate and then the top plate. Do not over-tighten them, or you could warp the plastic pod plate and take it out of alignment. The axle should now slide back and forth easily in the rear end. If you turn the car on its side, the axle should fall out.



Team NOVAH

TEAM SECRETS

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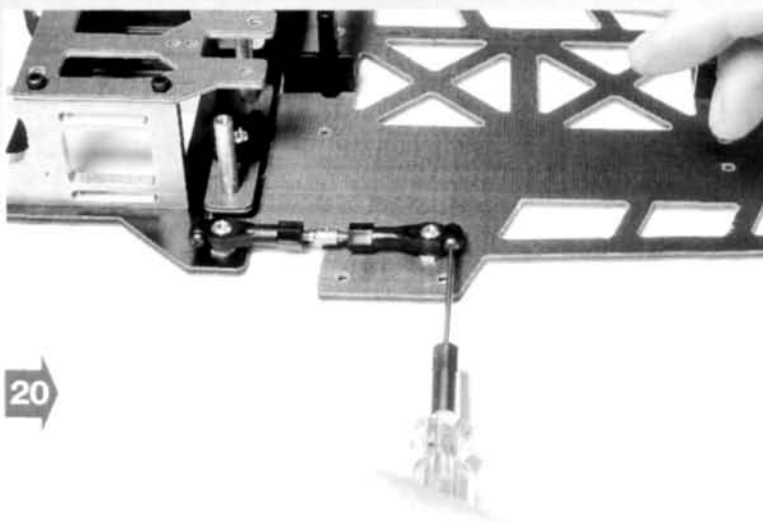
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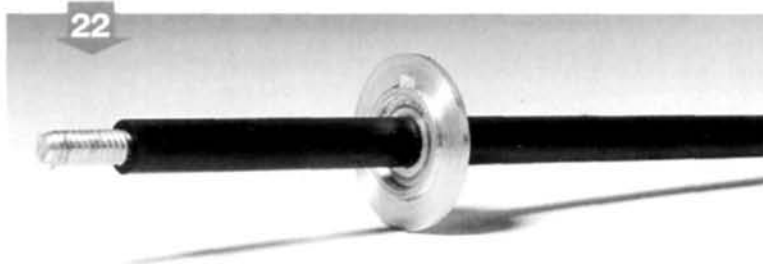
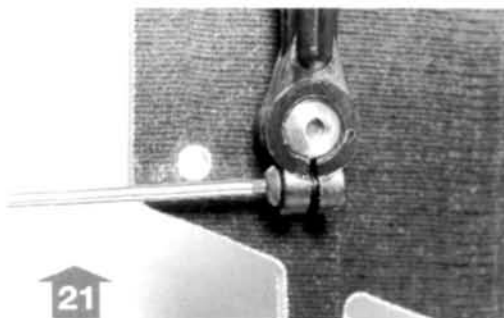
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JOEL JOHNSON'S EV10SS SPEED SECRETS

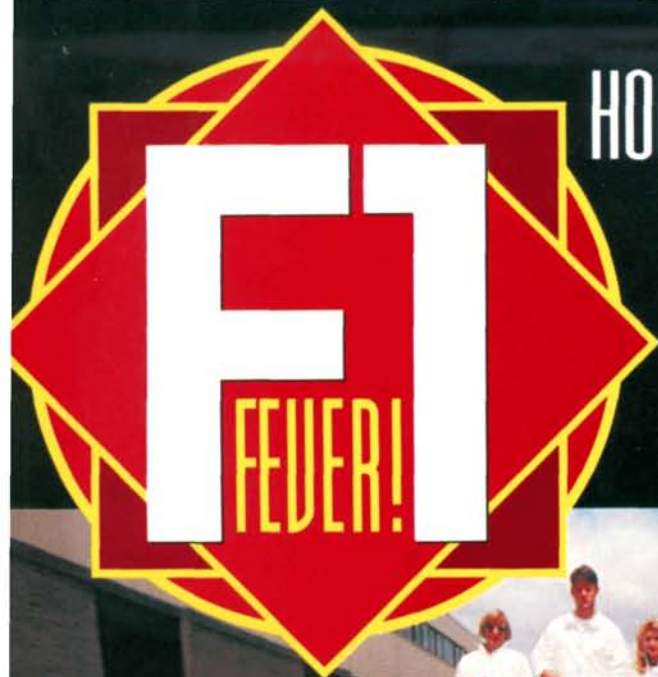


Next, make sure that the side links are as free as possible. One trick that helps this is to make sure that the heim joints aren't too tight. The idea behind the screw is that it should hold the heim joint and prevent it from spreading; make sure it isn't tight around the ball. The heim-joint screw is properly adjusted when there's a slight gap between its head and the joint. This way, there's a slight bit of flex in the joint itself, and it doesn't bind under load.



The last detail when building a great race-car is installing a good differential. This trick is a must for serious racers: pin the diff axle to make sure that the diff washer or pressure plate does not spin on the axle. I use the Trinity diff-pinning kit (no. RC0118), which includes all the items you need to pin your differential.

So, there you have it—all the winning advice you need to build your EV10ss properly, like Joel's. Now you have no excuse; if you happen to put your car down on the line next to his, you'd better beat him!



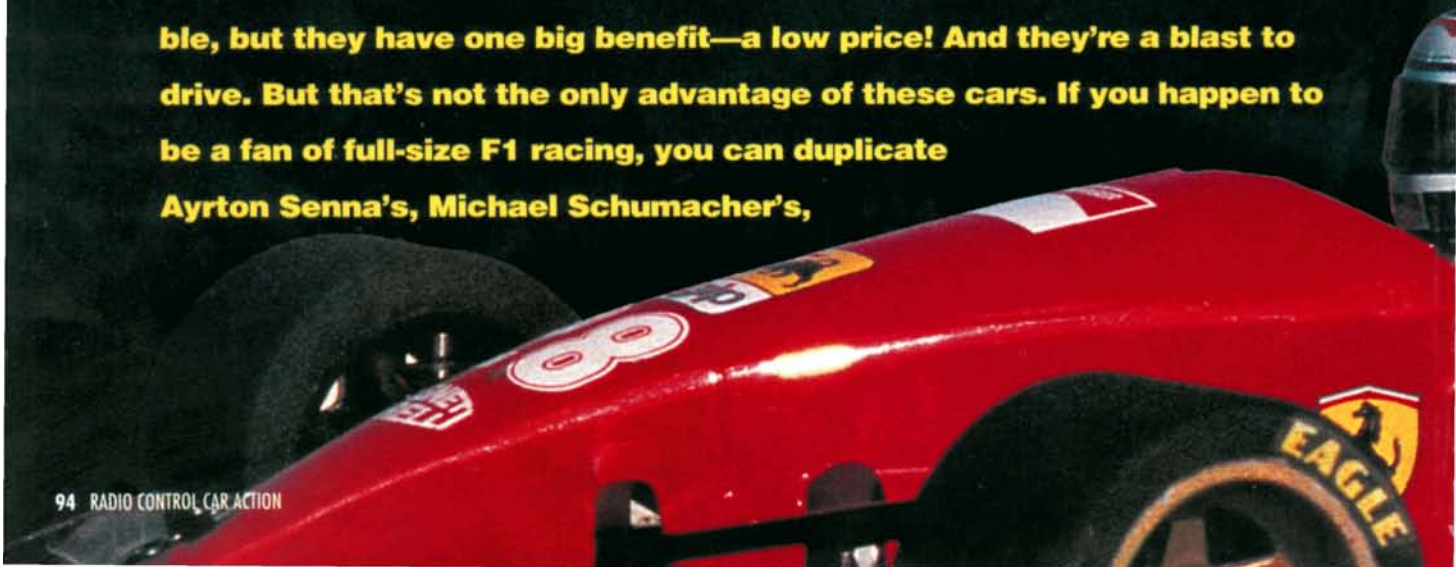
HOW TO GET INTO THE PREMIER PASTIME FORMULA FOR FUN

by STAFF



RIGHT NOW, no other racecars on the planet are more technologically advanced than F1 cars. They're extremely fast; they handle exceptionally well; and they're always put to the test on grueling international F1 circuit racetracks.

Like the full-scale versions, the R/C counterparts are also fast and nimble, but they have one big benefit—a low price! And they're a blast to drive. But that's not the only advantage of these cars. If you happen to be a fan of full-size F1 racing, you can duplicate Ayrton Senna's, Michael Schumacher's,



ING LOT RACER...

Damon Hill's, or any other of the top driver's cars. If you and a couple of friends get them, you'll be able to relive some famous F1 battles. Hey, you could even create your own new F1 war.

Parking lot racing is really beginning to take off, and we've compiled this special



feature to give you a glimpse of F1 "parking lot style" and show you what it's all about. We show you some available cars, how to

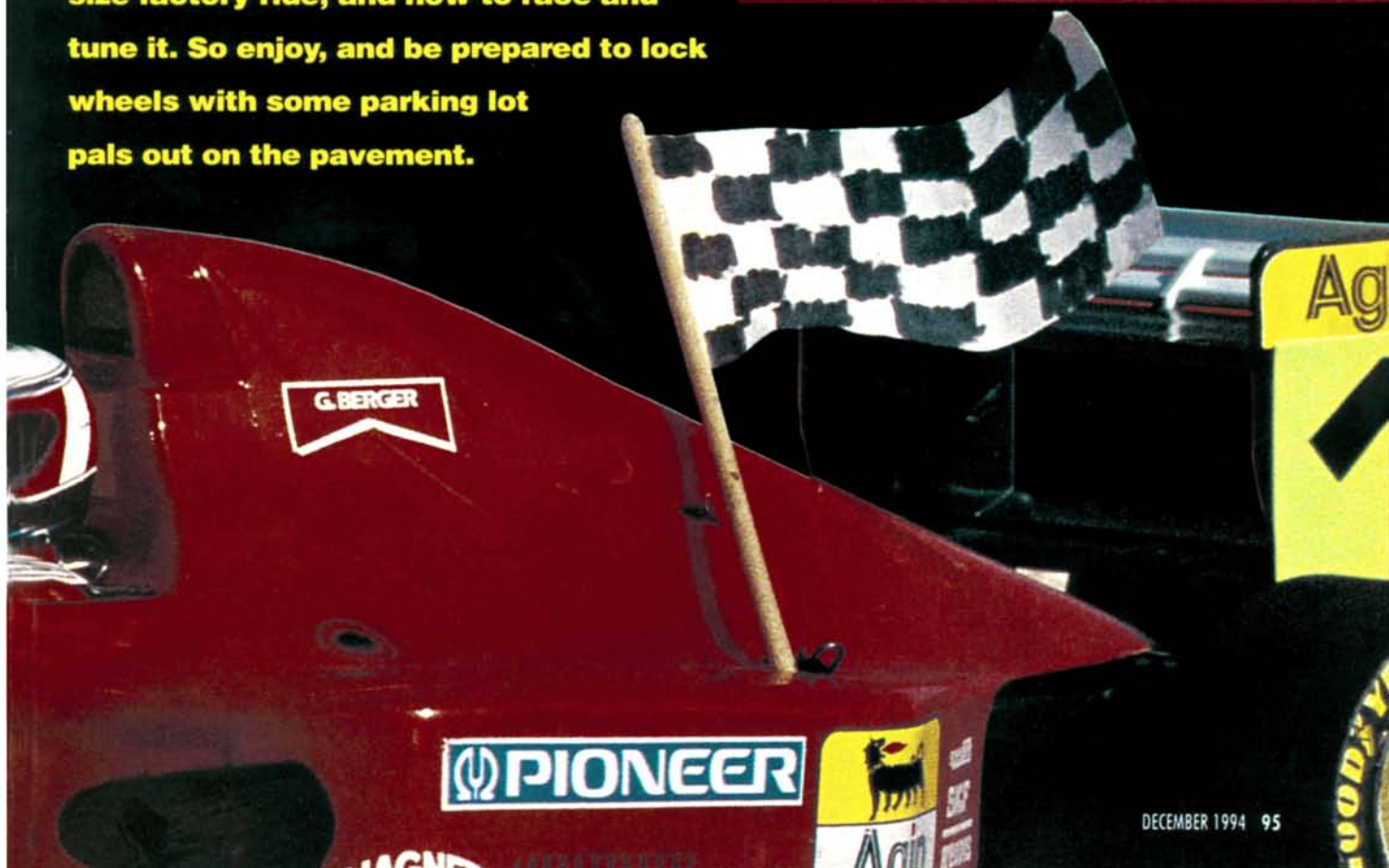
style your car so that it looks like a full-size factory ride, and how to race and tune it. So enjoy, and be prepared to lock wheels with some parking lot pals out on the pavement.

KYOSHO'S NEW IMPRESS



The all-new Kyosho Impress is the first "Pro-Level" F1 rolling chassis kit available for serious racers. It includes such features as:

- Full ball bearings (10 total).
- Independent front suspension with articulated arms.
- Adjustable hard plastic Maisonnette-style rear wing.
- Adjustable castor and camber.
- No body is included, but all the Kyosho body sets for the previous F1/Indy series will fit.
- Fiberglass chassis plate with upper deck bridge.
- Innovative, centered, vertical, steering servo-mounting system.
- T-bar rear suspension with updated roll damper.





HPI Hop-Ups

Are you the type who can't leave any R/C car stock? You have to have the trickiest ride on the block, don't you? Well, you'd better check out these two cars. When it

featured here don't meet the regulations of the Tamiya Series, so if you intend to race your car in one of their races, check out the rules in this F1 section. If all you want to do is smoke the locals at your favorite parking lot track, and they have an open or full-blown modified class with an

chassis, so testing began using chassis of different thicknesses. After thorough testing, they settled on a .120-inch thickness for the new F1 Super Stiff Chassis (no. 6182). The benefit of having such a stiff chassis is that it allows your suspension to work more

accurately. The chassis is narrow, but it's very strong, and flexing is almost non-existent.

• Performance. I popped in a Trinity modified motor and took it to a local parking lot



comes to soupin'-up F1 cars, HPI is the undisputed king of parking lot after-market hop-ups.

The two cars featured here are equipped with some of HPI's latest high-performance mods for the Tamiya F103 Series of F1 cars. I had a chance to do some thrashin' on them, so check it out.

By the way, the chassis

"anything goes" set of rules, then read on.

SUPER-STIFF CHASSIS

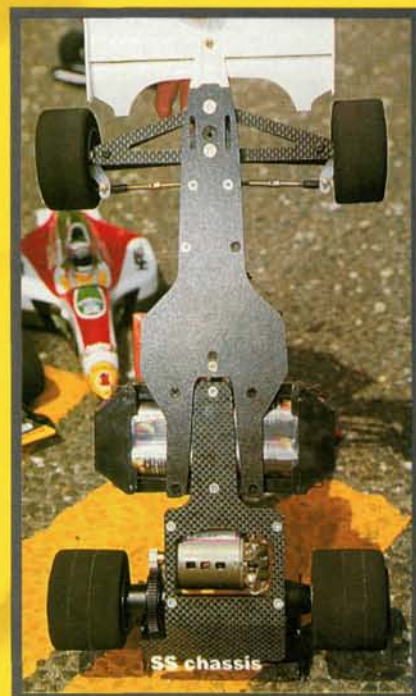
HPI designers wanted to offer a graphite chassis that would be as stiff as anything on the market without using a double-deck chassis kit. They thought that it would be easier to work on a car that had a one-piece

chassis, so testing began using chassis of different thicknesses. After thorough testing, they settled on a .120-inch thickness for the new F1 Super Stiff Chassis (no. 6182). The benefit of having such a stiff chassis is that it allows your suspension to work more

accurately. The chassis is narrow, but it's very strong, and flexing is almost non-existent. To reduce chassis weight, HPI milled out the sections where the receiver and ESC go. When I installed my radio gear on the milled-out sections, I used servo tape and

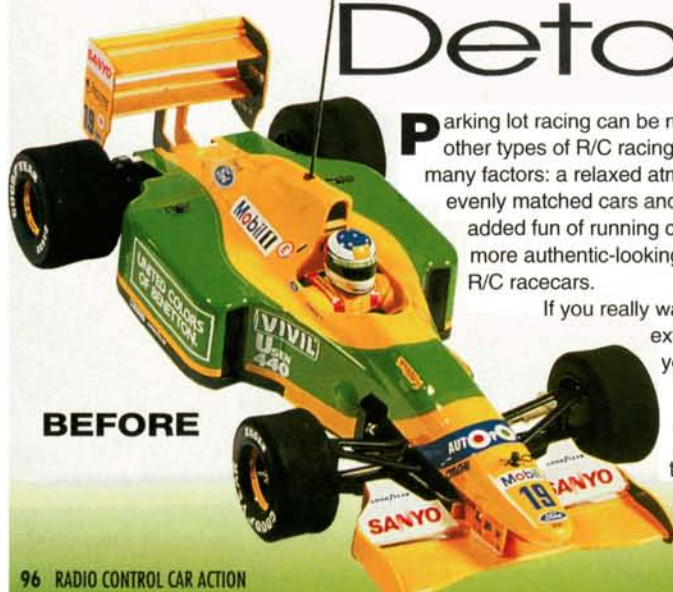
a few dabs of Shoe-Goo* for added security.

• Miscellaneous mods. The car I tested was also equipped with a few other HPI mods: a .060-inch-thick graphite Aero T-bar lower brace with a 30-degree kick-up in the rear (no. 6305), an .060-inch-thick graphite upper



(bad choice of motor, by the way—too much horsepower for this car). I should have used a good stock motor for basic bashing; a Trinity* Green Machine 2, Slot

Details, Details



BEFORE

Parking lot racing can be more fun than other types of R/C racing because of many factors: a relaxed atmosphere, evenly matched cars and, of course, the added fun of running cars that are more authentic-looking than most R/C racecars.

If you really want to go the extra mile to make your parking lot racer look like the real thing, first, look through some full-size-car magazines

for the latest additions to F1 cars. Last year's additions included "sideboard" air dams behind the front wheels of some cars. These are easy to simulate using small pieces of scrap Lexan painted to match the body's paint scheme.

Also, most of the F1s on the circuit have a small radio antenna on the nose of the car. No, this isn't used to get jammin' tunes during the race; it's for the onboard telemetry system that transmits sensor readings from the engine, suspension and tires back to the pits while the car is out on the track. This can be duplicated in scale using a small piece of flexible wire or plastic. Don't use a rigid piece of wire because it may "snag" any other cars, guardrails, or the fingers of a turn-marshall.

Of course, the driver figures that come with

Machine 2, or Monster Horsepower 2 would have been a better choice.

The stiff, light chassis did allow the car's suspension to work more efficiently, and the car turned on a dime. I quickly found the limits of the stock Tamiya foams. If you're looking for a lot of bite, check out some rubber caps for your foams from Tamiya, HPI, Kyosho and Pro-Line*.

All in all, I was very pleased with the car's performance. The chassis allows quick, easy maintenance and tuning, and it also gives it that extra-trick look. I had no problems setting up or working on the car, and if you want to hop up your F1 car for local racing, then this is the way to go.

FORMULA 1 MONOCOQUE CHASSIS

HPI started the F1 Monocoque Chassis project almost two years ago. It was designed to be the baddest F1 car chassis on the market and, by the looks of it, I'd say it is!

To obtain the information needed to produce such a complex design, HPI contacted a company that produces graphite pieces for full-size racing cars. They came up with a chassis that's similar to the inner tub of a full-size F1. The chassis consists of two pieces of woven graphite that are epoxied together. The top half of the chassis is .040-inch-thick graphite, and the bottom half is 0.060-inch-thick

graphite. Laying out the graphite for the vacuum-formed mold is a complicated process.

When HPI designed the chassis, there had to be enough room to mount the steering servo vertically and mount the receiver and ESC in the cockpit space. Also, the chassis had to fit under the stock Lexan body shell. As you can see, it's a tight fit, but this chassis makes a potent-looking, extremely nimble machine that handles really well.

• **Miscellaneous mods.** The car was also modified with the same after-market pieces that I tested on the car equipped with a Super Stiff Chassis. (see previous section).
• **Performance.** Once again, I used a Trinity modified motor, and the car was just too fast. But, even with the hot motor, I could tell that this chassis enabled the car to be all it was intended to be—stable at high speeds while having quick, responsive handling.

There are, however, some drawbacks to this chassis. It's very



Monocoque chassis

expensive—in the neighborhood of \$330. Ouch! It's also hard to work on because there's virtually no spare room in the cockpit. I used a Novak* HPC and a Futaba* PCM receiver, and I didn't have much room to spare. Setting up the steering servo is kind of a pain, but once it's set, you can forget about it.

OK, so those are my gripes. As you can see, they're not really major. If you have the money, this is the most trick-looking chassis out there, and you'll be the envy of all your parking lot pals. And when you've set the steering servo, you can just forget about it. If you're looking for the most high-tech, high-end F1 racecar out there, then look no further; this is definitely it!

— John Howell

most of the currently available F1 kits are well-detailed and come with all the appropriate decals to simulate a real driver's helmet markings. But how do you get these decals to stick to the helmet's curves without wrinkling? Before you apply the decals, dip them in soapy water (use a few drops of dishwashing soap). This buys you a little slide-around-positioning time. Once they're in position, use a heat gun (or a hair dryer) to soften the decals so that they'll wrap around the helmet easily. And don't forget to paint the driver's suit in a color that matches the car's paint scheme. Paint the driver from the outside of the body so that the suit, gloves and wheel don't look glossy.

You may have noticed that some cars have different markings for every race and that, sometimes, the sponsor's logo is omitted. This happens mainly when a car that's sponsored by a tobacco company races in an F1 event in a country where

cigarette advertising is prohibited. As a result, cars sponsored by Marlboro, Camel, Players and Mild Seven run incognito. Also, watch how many elements are in the rear wings of the cars because, depending on the track conditions, even this can change from race to race.

All the Goodyear tire stenciling on the full-size tire sidewalls is actually in yellow, not white. Of course, on an R/C F1 car, this is easily fixed with a quick stroke of a yellow broad-point Sharpie permanent marker over the existing tire decals.

— Mike Ogle





Do you want to make your Kyosho* or Tamiya* F1 chassis run solidly and consistently? Refer to these tips every couple of races, or more often if your car isn't handling the way you want it to. It's all here!

F1 Tune-o-Rama

RIDE HEIGHT, TIRE SIZE AND STAGGER

Make sure that your car's front end is high enough to avoid scraping the bottom of the chassis or the front wing on the ground, especially when cornering. When the front end bottoms out, you lose steering, and the car pushes badly.

Tire size is critical when you've reached your traction limit; you know your fronts are worn down too much when the car hooks, i.e., it wants to continue to turn sharply after it has entered a turn. They're too tall when you can't get the car to turn in very well even when the fronts are fully juiced. Rear-tire sizes of 55 to 60mm and fronts of 53 to 57mm are pretty safe ranges.

Also, make sure that the front ride height is slightly lower than the rear. If the rear is lower than the front, the car will spin out easily, especially under partial throttle.

AERODYNAMICS

Believe it or not, wing and body sets have a major impact on handling. The early Benetton, Ferrari F189 and Sauber wing sets have less front bite on a Tamiya chassis than the Benetton B192, Lotus 107B, Footwork, Jordan, or Williams pieces. The Kyosho seems to handle the same with either the Lola or Williams body sets.

On the rear, I recommend that you install a hard plastic Tamiya wing (Footwork, Lotus, Sauber, or Benetton) on either brand of car. They're much more durable and consistent than the Lexan wings that come with the older body sets. If necessary, hard wings can be spray-painted to match your color scheme. I apply light coats using a whole can of Pactra* polycarbonate paint followed by a top coat of Testors Modelmaster clear to give it some shine. To mount a Tamiya wing on a Kyosho car, cut off the tabs on the front mounting surface; the hole pattern is identical.

GEARING

If you use the stock spur, start with a 20-tooth pinion on the Kyosho and a 17-tooth pinion on the Tamiya. (Remember that you have to use a metric 48-pitch gear on the Tamiya.) In both cases, that works out to about 48mm of wheel rotation for each revolution of the motor, and that's ideal for virtually any kind of stock motor in these cars.

If you run a modified, start with a pinion in the 14- to 15-tooth range, and work up from there. A larger pin-

ion gear will make the car come out of the corners more softly, but you'll carry more speed into the apex. A smaller pinion gear will cut down on straightaway and entrance speed, but it will provide more punch coming out of turns. Try both to see which fits your driving style.

POD ADJUSTMENTS

Both Tamiya and Kyosho F1 cars have the rear pod installed on rubber O-rings. To a certain extent, rear traction can be adjusted using the rear flex-plate screw. The looser the screw, the more traction you'll have. Be careful not to make the rear screw so loose that the pod just flops around. This is one of those "set and forget" adjustments that you won't have to change very often.

On cars with damper plates, you might want to try silicone fluid or shock oil in different weights between the plates and pucks to change the damping rate. Thicker fluid will slow down the pod's transition speed in sweepers and tight S-type turns.

On earlier 102 Series Tamiya chassis, shock-fluid weight and spring preload both have a substantial effect on how much rear traction is available. On parking lot tracks, start with 10W and no spring collar. On high-traction, carpeted surfaces, 40W shock oil and a preload collar work really well to eliminate push in tight turns.

TIRE COMPOUNDS AND FRONT SPRINGS

Most F1 cars come with soft rear donuts and hard- or medium-compound front tires. These work well in most situations, so you really don't need lots of different types of tires. When replacement time comes around, you can use stock donuts, or choose from tires offered by DuraTrax*, HPI* and PSE*. Although 1/12-scale donuts work pretty well, when they're trued, the outside diameter tends to wind up a little smaller than you really want. If you can get HPI rough-cut donuts in green rear (5076) and blue front (5085), try them. I've been very happy with the results.

Tamiya includes three sets of front springs with their replacement steering-spindle set. With these and the extra-light set that comes with each car kit, you'll have springs for every occasion. Right now, I'm using the middle silver springs to run on carpet, but I've used the heavy black springs on pavement. You'll find that front springs can make a big difference in the way your car handles the turns, especially if you only use one tire compound.

—Doug Mertes



*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

Ready to Race?

So now that you have your stylin' F1 Tamiya car, and you want to race it, what's your next step? The Tamiya Championship Series of parking lot races features Tamiya's F1 cars and its FWD and 4WD sedan cars. The Series was designed to keep things fair; you compete in a class with drivers who have the same skill level and similar equipment. This really puts life back into box-stock racing! As an added bonus, winners of each class receive a trophy and a free Tamiya car. To make things more interesting, you'll win a different car from the one you raced with, e.g., if you won with an F1 car, you'll receive a sedan or an FWD car. Pretty cool, huh? So check it out. If you have an F1 car, take a look at the following rules and the remaining races in the Series.

TAMIYA Championship Series Rules



General Rules: Stock

- Cars must be run as they come out of the box with no modifications.
- Cars must run the stock 540-type motor.
- Cars must use the original bullet-style motor connectors.
- Handout battery pack must be used with original Tamiya connector intact.
- Chassis lightening or stiffening is not allowed.

Modified

- Only Tamiya hop-up options and spare parts are allowed.



- Any type of fixed-timing bushing motor is allowed (by any manufacturer). Motors using ball bearings or adjustable timing are not allowed.
- Handout battery pack must be used with the original Tamiya connector intact.
- Chassis lightening and stiffening are not allowed.
- Modified F1 cars may run only American-spec gears.

Technical Rules

F1 and Indycar

- Only Tamiya F1 and Indy-type chassis are allowed.
- Tamiya foam tires only; no after-market tires allowed.
- No traction compound or tire sauce allowed.
- Minimum weight (fully equipped): 36 ounces.

All vehicles

- Tamiya parts only. No after-market parts. Exceptions: motors and gears (in the Modified class only) and



A cool thing about racing F1 cars is that you can style out your car like your favorite full-size car.

servo-saver and antenna.

- Any 27mHz or 75mHz radio system may be used.
- Pinion-gear size (number of teeth) may be changed.
- All vehicles will be inspected by race officials before each qualifying heat and final.
- Vehicles must be painted in to depict actual or fictitious racing teams.
- Driver figures must be used.



UPCOMING EVENTS

Race 8—Nov. 27, 1994, Sheldon's Hobbies, 2135 Old Oakland Rd., San Jose, CA 95131; (408) 943-0220.

Race 9—Dec. 11, 1994, Miami RC Speedway, Miami, FL.

Race 10—Jan. 29, 1995, T&T Eagle, Plano, TX.

Race 11—Feb. 26, 1995, Hobby Hangar Speedway, 4433 A Brookfield Corp. Dr., Chantilly, VA 22021; (703) 631-8820.

Race 12—May 21, 1995, Larry's Performance RC, Waterford, MI.

How To: Make Capped Tires

DO YOU OFTEN run your car on asphalt? If you do, you know what it's like to wear out an entire set of foam tires in a single race day. You also know how frustrating it can be to try to get traction when you're racing on a hobby-shop parking lot with regular foam tires.

If you race on one of the high-bank superspeedways that are scattered around the country, you probably run with capped tires. For the uninitiated, these are regular foam or Styrofoam tires that have a thin layer of racing rubber bonded to their outsides.

This type of tire is great for the big ovals, but what should we average parking lot racers use? We'd like to have the durability of capped tires, but without their high cost (usually \$12 to \$18 a tire). And it would be nice if they could be used on the flat paved surfaces that we're used to dealing with, but traditional capped tires don't do very well on it.



Well, parking lot racers, Kyosho*, Tamiya*, HPI*, and Pro-Line* have responded to our needs! They now sell rubber tire caps for Formula 1 R/C cars, and I predict that stores will have a hard time keeping this stuff in stock! Not only do they fit all the F1 and Indy cars, but they also fit all 1/10- and 1/12-scale pan cars and almost any other car that uses foam tires!

Basically, Tire Cap Rubber is a cylindrical piece of soft, sticky—and I *do* mean sticky—racing rubber that you glue to your foam tires. Any foam tire that has been tried to between 55mm and 61mm will fit inside a Tire Cap. There's enough rubber (the piece you get is about 4 3/4 inches wide) to do an entire set of foams for just about any type of car, but folks who run 2-inch-wide rear rims on their 1/10-scale cars should pick up two packages. I was able to mount it on several types and sizes of rim and foam compound without any trouble at all.

Here are a few words of advice: the softer the foam that's mounted on the rim, the softer the completed, capped assembly will be. Capped Green- or Yellow-compound foams will give you super-high traction—just the ticket for the slippery racetracks that some of us have to deal with. Blue- or Blue/Orange-compound foams are much firmer. On a parking lot oval, where too much front traction can easily cause spinouts, this combination would be great for your front tires.

Follow along as I mount a set of Kyosho's Tire Cap Rubber (no. FJW9) caps on some new, chrome-plated Kyosho F1 rims. I'll see you on the parking lot!

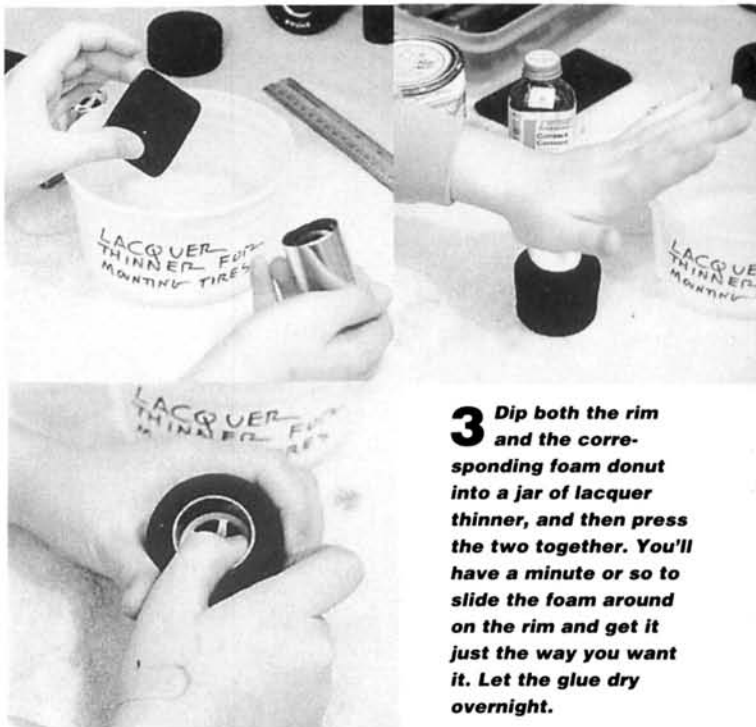
— Doug Mertes



1 Start by applying a layer of contact cement (I like Elmer's or Weldwood) to a clean rim. I used one of Kyosho's neat new chrome-plated rims for their Formula 1

Series, but this technique will work with any type of rim.

2 Put a layer of the same cement on the inside of the foam donut. Let it sit for about 15 minutes.



3 Dip both the rim and the corresponding foam donut into a jar of lacquer thinner, and then press the two together. You'll have a minute or so to slide the foam around on the rim and get it just the way you want it. Let the glue dry overnight.



4 The next day, you can true the mounted tires, if necessary. (These F1 donuts came pre-trued—a lazy racer's dream!)



7 This time, dunk a tire-mounting horn (this photo shows the excellent Kimbrough* unit) as well as the rubber and the tire into lacquer thinner, and stre-e-etch the rubber over the tire assembly. Once again, you'll have a minute or so to get it just right.



5 Cut the Tire Cap Rubber to the correct width for mounting. I used two 1 1/8-inch-wide and two 1 1/2-inch-wide strips.



6 Apply a layer of contact cement to the outside of the tire and the inside of the Tire Cap Rubber, and let both pieces sit for 15 minutes. Try not to get any on the side-wall (it looks so unprofessional!).



8 Alternatively, you can stretch the rubber over an unglued, mounted donut, peel back one side of the rubber at a time, and glue underneath it before sliding it back.

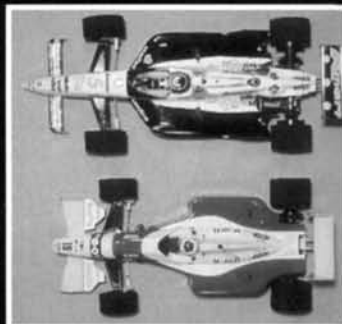


9 Let the finished product sit overnight, and you'll be ready to conquer the parking lot!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

F1 vs. Indy

What are the differences between full-size F1s and Indy cars? At first glance, you might think that there's little to tell them apart, but if you look closely, you'll find many differences. In the power department, F1 cars are limited to normally aspirated, 3500cc engines with a maximum of 12 cylinders. Indy cars have turbo-powered 2650 to 3430cc engines with a maximum of eight cylinders. F1 cars use "pump" gasoline, and their minimum weight is 500kg; Indy cars run on methanol, and their minimum weight is 703kg. Both cars have similar acceleration times: 0 to 60mph/2.0 seconds and 0 to 100mph/4.5 seconds, but an Indy car tops out at a whopping 230mph, 20mph more than an F1 car.



Other differences are easier to spot. The most obvious is that Indy cars are usually longer, and they have larger side pods that are lower than those in F1 cars. As of this writing, F1 cars have an air box behind the driver's head. This device is used to "ram" air into the engine at top speed. New rules imposed by the Fédération Internationale de l'Automobile, however, have banned these devices for next season. Indy cars use smaller front and rear wings on the superspeedways.

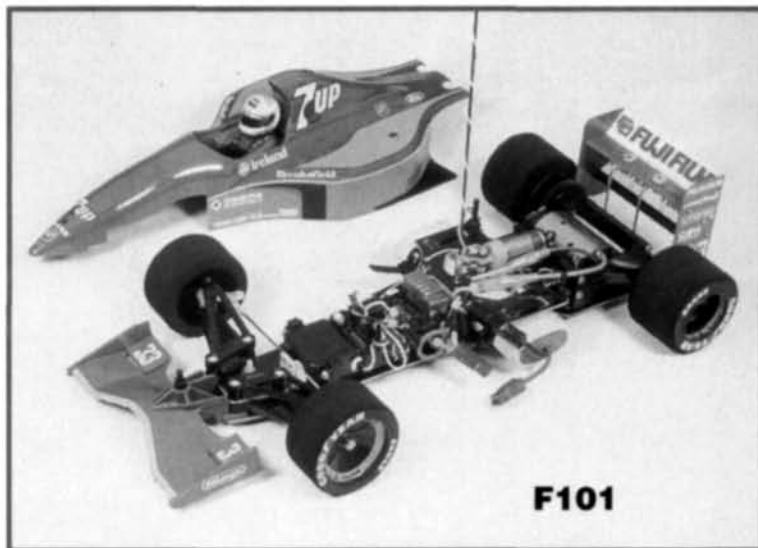
With R/C cars, there are also differences between F1 and Indy cars. Take, for example, the Tamiya Newman/Haas Lola. This Indy car uses the same chassis design as the Lotus shown here, but the main chassis plates are slightly longer. Because the Lola was modeled after the car run at Indianapolis, it has smaller wings on the front and rear. Like the full-size cars, the body is longer and has larger, lower sidepods than F1 cars. If you have the 103 F1 chassis, you can convert it to Indy style by switching the chassis plates, wings and body.

—John Huber



Easy as 1,2,3

If you're interested in Tamiya's F1 series of racecars, you have a choice of three basic platforms: the F101, the F102 and the F103 chassis. For each chassis, there's a variety of bodies from which to choose, so if the Ferrari 189 isn't your style, then maybe the Benetton B192 or the Sauber Mercedes-Benz is.



F101

Above: the F101 chassis features Tamiya's FRP (fiber-reinforced-plastic), semi-double-deck chassis and a three-point suspension system consisting of two coil springs on kingpins up front and a single oil-filled damper that controls rear pod movement. All F101 cars come equipped with 44mm front wheels.

Roots of F1

It's difficult to say when F1 racing was born. F1 is simply the highest pinnacle of motorcar racing. Even though F1 as we know it has only been in existence since WW II, its roots go back to the very first cars—back to the late 19th century.

In 1895, the first real "motor" race was won by Emile Levassor in a Panhard-Levassor two-seater powered by a 1.2-liter Daimler engine that put out 3.5hp. Other car makers began to build racecars, and, in 1906, the first Grand Prix (GP) was held in Le Mans, France. In 1907, a fuel formula was introduced, and a limit of 50.8 gallons per tank was imposed. Over the next few years, further restrictions were made to the engine size and weight. A formula was in the works so that cars could be designed using the appropriate specifications.



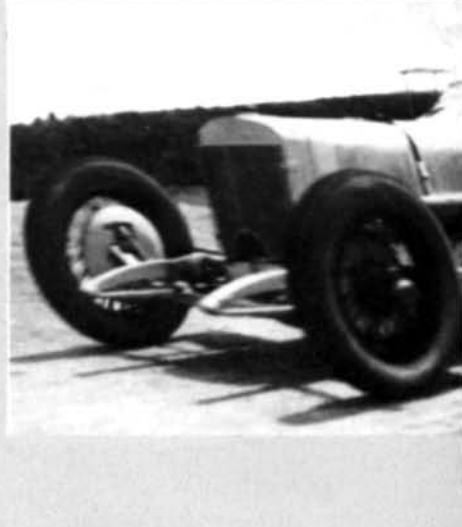
MERCEDES-BENZ

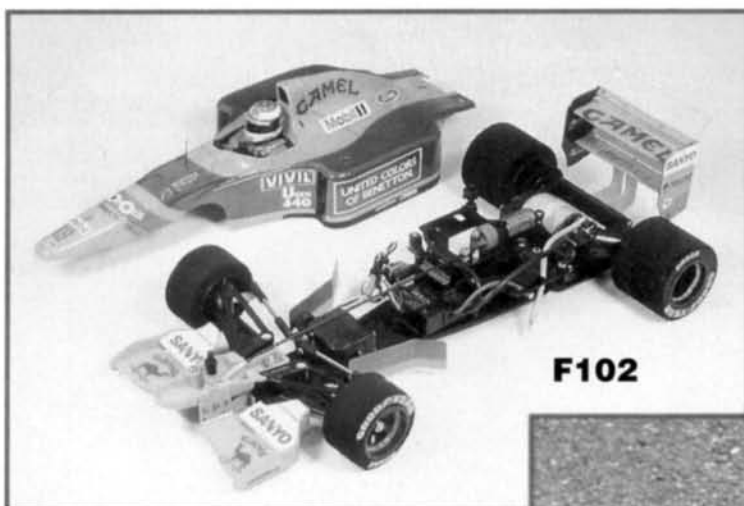
In 1914, a more standardized set of formulas was needed to keep things on an even playing ground. A limit was placed on the number of cylinders allowed, and the engine displacement was limited to 4.5 liters. In the 1914 French GP, the first three places were taken by German-built Mercedes-Benz cars. A few months later, after the start of WW I, the same Mercedes engines were used to fly German fighter planes into France. Motor racing was put on hold until the war was over.

When racing resumed, there were more rule changes. Over the next few years, engine displacements were increased and decreased. In 1921, the limit was set

ate specifications.

In 1914, a more standardized set of formulas was needed to keep things on an even playing ground. A limit was placed on the number of cylinders allowed, and the engine displacement was limited to 4.5 liters. In the 1914





F102

Above: the F102 platform is similar to the F101 in design, but there are a few subtle differences. The F102's chassis is narrower, and the batteries are slightly more forward for better weight distribution. Like the F101, the F102 uses two coil springs on kingpins for front damping and a single shock for rear damping. Instead of 44mm front wheels, the F102 series comes with 36mm wheels.

Below: the F103 chassis uses an even narrower chassis than the F102, and it has a more rigid, double-deck design. Front suspension is similar to the F101's and the F102's, but the rear is equipped with a single rear shock and an upper, friction-damper plate. The battery-mount on the F103 is farther forward than it is in the F102. All F103 cars come with 36mm front wheels.



F103

at 3 liters; in 1926, it was reduced to 1.5 liters. In 1925, they dispensed with the riding mechanic, but his seat remained. Other changes during the '20s allowed smaller sports cars to enter the GP racing scene.

In the early '30s, motor racing was used as a propaganda platform. The fascist Italian leader Mussolini supported the Alfa Romeo team. Hitler was not about to be outdone by Italy, and he endorsed both Mercedes and the Auto Union teams. Both Germany and Italy battled it out over the years, and each won many races.

After the war, the Germans were unable to race. The Mercedes plant had been completely destroyed, and when Germany was divided, the Auto Union plant was behind the Iron Curtain. Italy flourished without the Germans, and competition raged between Maserati and Alfa Romeo.

On October 2, 1947, the Fédération Internationale de l'Automobile (FIA)



announced the formation of two classes of GP racing. The existing grand class was named F1, while a new class—the F2—was formed for cars with 500cc supercharged, or 2-liter non-supercharged engines. This was the true birth of F1 racing.

The first world GP—the British Grand Prix—was held in 1950 in England. Since then, F1 racing has continued to grow wildly. The 1.2-liter, 3.5hp engines of the past have evolved into 3.5-liter, 675hp missiles capable of speeds of more than 200mph.





Ten Best F1 Mods

SO, YOU'VE made the big decision: you're going to participate in one of the Tamiya Regional R/C Championship races that are held at parking lots across the U.S. Your driving skills are honed to a fine edge, and you want to make sure that you've got the right equipment to do the job.

One possibility is to simply race in the box-stock class. No special parts are necessary, and the racing is incredibly close. With kit motors and hand-out battery packs, nobody has a power edge over anyone else, and races can be decided literally by inches.

But you want something more—a chance to race with the Big Guys, the Power Mongers, the...well, I think you know what I mean. Which modifications are really worth sinking your bucks into? Check these out. Even if you're not interested in racing, these mods definitely will enhance your car's performance.

—Doug Mertes

These four mods will give you a nice, tight, durable front end that's fully adjustable:

1 For a start, get a set of ball bearings for the front wheels (Tamiya part no. 53080). The car rolls pretty freely with the kit's bushings, but bearings will make the front wheels track much truer, and it will be easier to set toe-in properly.

2 Next, add a high-torque servo-saver (Tamiya part no. 50473) and...

3 Turnbuckle tie-rods (Tamiya part no. 53150).

4 A set of springs in three weights (part no. 50509) allows you to add or subtract steering response on different surfaces.

A modified motor?

5 Yep, Dave Berger, the winner of the inaugural race at the Tamiya Corporate track, ran a 17-turn motor all day long. As long as it's a bushing motor, it's legal!

For the back end:

6 If you're running a 103 chassis, get a set of low-friction pads (Tamiya part no. 53149); they really smooth out the rear damper assembly.

7 A metal motor mount (Tamiya part no. 53106) is an absolute must if you're running a modified class car. At the speeds they attain, one wall-whack will split the kit mount, and you're finished!

8 A lightweight rear shaft in fiberglass (Tamiya part no. 53091) or carbon fiber (Tamiya part no. 53116) is another must-have item. Installation of this piece is the single largest weight saving you can make; it cuts $\frac{3}{4}$ ounce off the weight of the steel stock axle. That's rotating weight, too!

9 Finally, find a standard Tamiya spur-gear adapter. (HPI* sells the gear adapter with its spur gear.) This will allow you to run standard $\frac{1}{8}$ -inch diff balls and American standard 64- or 48-pitch spurs and pinions. This is the only non-Tamiya chassis part that the race organizers have permitted in the modified class. The stock spurs are really very good, but they're only available in one size, which makes it tough to get gearing just right when you're running a modified or hot stock motor.

As far as tire selection goes...

10 You really should talk to racers in your area to find out what works on your particular surface. Surprisingly, the best tires for parking lot tracks right now seem to be kit tires! Probably nine out of 10 racers at the California race were running kit rears and fronts, and no tire-traction compound was allowed. Tamiya's HBR rubber, while expensive, seems to provide good traction and long life on outdoor tracks; it's available in soft and medium compounds. On carpet tracks, $\frac{1}{12}$ -scale green donuts seem to be more consistent from start to finish when used with traction compound. I've also talked to racers who use the new DuraTrax* foam tires in yellow and green compounds. HPI tires seem to work well, too. It's a good idea to mount up two or three sets, so that you can be prepared for whatever surface conditions you encounter.

A number of additional hop-up items are available from Tamiya, including graphite chassis parts, hardened diff balls, special shocks and titanium screws. They all fit well, but the ones I've mentioned here have proven themselves in the heat of competition to be truly worthwhile. Whatever choices you make, I'm sure you'll have a lot of fun racing your F1 car! Just remember though, you don't need any of these mods to compete in F1 racing. These are different classes for different skill levels and, obviously, wallet sizes. Whatever type racing is for you, just go out and have a blast doing it!



What's the diff?

by DOUG MERTES

ON-ROAD

Diff Basics

WE ALL KNOW that weight is a racer's biggest enemy. Hot batteries and fast-o-matic motors are worthless if you're 3 ounces over the minimum weight; we strive to come as close to the class *minimum* as possible. Look at the rear pod of any top-caliber stock or modified on-road or oval racer, and you'll see hardware that would have

been considered pretty exotic just a few years ago. Hardened and anodized aluminum, titanium, graphite, Teflon and other space-age materials are fast becoming the norm. But weight *distribution* is important, too, so I'll show you how to lose weight in an area that will maximize your speed advantage!

First, you should understand the concept of low rotating mass. Think of it

this way: imagine swinging your arm in a circle while you hold a baseball. It isn't very difficult. You can really whip your arm around and get it up to speed in a hurry. Now imagine trying to do the same thing while holding a bowling ball. Not too easy, is it? It's tough to get that heavy ball moving and even harder to keep it under control, and it takes a lot of energy to keep up the momentum.

It takes a lot more energy to get a heavy axle/hub/differential assembly moving—and to keep it moving—than



(1)

(2)

(3)

(4)

The Definitive Diff

What is a differential, and why do we spend so much time assembling, adjusting and perfecting our diff action? Well, when your car goes through a turn, the inside wheels travel a shorter path than the outside wheels. The drive wheels need to receive the same power,

but they also have to run at slightly different rates, or one—or both—may break traction, and you'll spin out or slow down.

The differential allows the wheels to roll at different speeds while maintaining traction balance. Many of us started with entry-level cars that had gear

diffs. The diff action was pretty good (remember how one wheel would turn forever when you spun the opposite one?), but that type of diff isn't easily adjusted.

Ball diffs are actually large, "ball-raced" thrust bearings with teeth on the outer race—the spur gear.

You must keep them clean and properly lubricated. I'll show you how to assemble a top-quality differential.

(1) • Place all the components on a clean, lint-free cotton shop towel. Lint and dust make a diff gritty!

(2) • Clean all the bearings and other metal components with a good-quality



Above: A) These $\frac{1}{12}$ -scale components are from Niftech Racing*. They're among the lightest, strongest you'll find. One-twelfth-scale racers need low rotating mass, because they need efficiency in their 8-minute, 4-cell races. Niftech includes a pair of "thermo-forged" hub screws for the left hub, a pinned titanium diff face that's drilled to reduce weight even more, a hollow graphite axle with an aluminum core and special setscrew, and high-tech plastic "bearing savers" that reduce drag and impact on the inner race of the axle bearings. Combine them with Niftech's excellent micro-finish diff rings and balls (trick, lightened diff rings are also available), and you'll have a super-smooth diff that's 0.09 ounce lighter than the stock pieces. They also sell a really nice flat file for making the setscrew seat properly on your axle.

to move a lighter assembly. We're not talking muscle power here, either, but the precious voltage that you cram into your Ni-Cd. A lighter assembly in this critical area will make your car run faster, accelerate more quickly and use less juice.

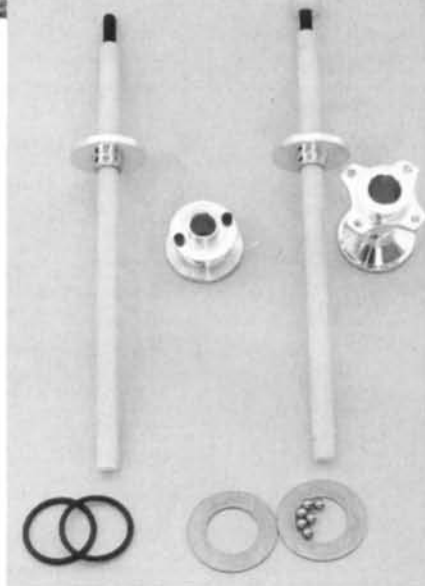
I gathered some of the neatest, newest and lightest hub and axle assemblies and tested them in my secret laboratory. I weighed each

component on a grain scale (they're calibrated to $\frac{1}{16}$ gram!), and then checked trueness with a rear-pod jig and a dial indicator (which measures run-out to $\frac{1}{10}$ millimeter).

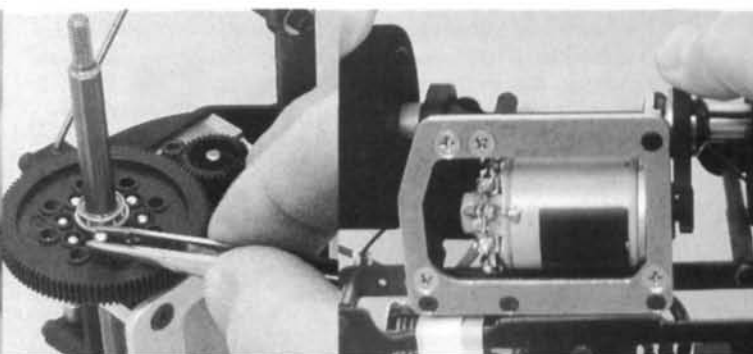
Finally, I assembled and tested the components for smoothness—that final "differential difference." Did I find any advantage to using these high-quality hubsters? Read on!

Right: B) Dave Irrgang at IRS Racing* makes

well-crafted, super-strong axles. I've used them on my Formula 1 and on-road cars. His Ultimate Diff kit for $\frac{1}{10}$ - and $\frac{1}{12}$ -scale cars includes a right hub, axle, rings and balls. Diff rings are held on the axle and hub by the pressure of large O-rings that are in a groove that's behind each diff ring (similar to a Corally car). Not only is the completed assembly lighter by 0.22 ounce in $\frac{1}{10}$ scale and 0.07 ounce in $\frac{1}{12}$ scale, but the balls seem to last longer, too. Perhaps the O-rings absorb some of the impact when a rear axle encounters bumps and walls. When assembled, this diff is incredibly smooth, and it locks down without causing drag on the diff action. IRS also sells diff-pinning material in 3-inch lengths.



(5)



(6)

(7)

(8)

motor spray to remove old oil, lube and grime. Use the spray two or three times.

(3) • Drill out the ball holes in the spur gear with a $\frac{1}{8}$ -inch bit (a Dremel tool works well here) to prevent them from getting tied up. When you've finished, they'll drop out of the spur easily. That makes it harder to assemble the diff, but also helps to give it a really

"free" feel when it's tightened down.

(4) • Clean the spur gear with hot, soapy water and an old toothbrush, and dry it thoroughly.

(5) • Put just enough diff lube (I like Aero-Car's* Goo Lube) on the end of your finger to pick up the number of balls you use. You'll get better at this with practice. (Don't use too much!)

(6) • Rub the balls and diff lube into the palm of your hand to coat the balls with lube.

(7) • Assemble the diff with the axle installed in your car and lying on its side. It's nice and stable that way, and you can use both hands to position the pieces. I use a pair of tweezers to insert the balls into the spur gear.

(8) • Tighten the diff nut until

you feel it start to bottom out; then break in the differential by holding the spur gear and spinning the wheel, tightening the diff nut a little each time, until the diff is as tight as you want it to be. Check it by holding each wheel and trying to turn the spur gear with your thumb; it should be very difficult to move.

Complete Assemblies

1/12-Scale

Manufacturer	Wt. (oz.)	Wt. saving (oz.)
Stock Associated	0.98	
Cuda Lite	0.73	0.26
Barracuda	0.91	0.07
IRS w/Inside Line lh*	0.91	0.07
Niftech	0.88	0.10
Inside Line w/stock axle	0.78	0.20
CRC w/stock axle	0.82	0.17

1/10-Scale

Stock Associated	1.30	
Cuda Lite	0.95	0.35
IRS with BRP lh*	1.06	0.24
Inside Line w/stock axle	1.05	0.25

*left hub

You can mix and match components to come up with light combination. For instance, a stock axle, a Bud's left hub and an IRS diff hub with Cuda Lite titanium screws equal a complete 1/10-scale assembly that only weighs 0.97 ounce, or a saving of about 0.33 ounce over stock! Experiment to come up with your own combination.



E) BRP* sells only left-side hubs. Made of solid magnesium, this 1/10-scale component is very light and true, but somewhat expensive and difficult to make. Real magnesium parts tend to turn a dull gray over time, but that just makes them look like serious racer stuff. This 1/10-scale left hub is among the lightest. It comes with hardened-aluminum cap screws and two hollow setscrews (for maximum security). This hub will save you 0.11 ounce! BRP also distributes a full line of diff parts, including ceramic diff rings (porky, but oh-so-smooth), spacers, shims, lube and balls.



C) Frank Calandra at CRC* offers some of the most interesting R/C stuff around, but his 1/12-scale-

car hubs have to be seen to be believed! The left hub is a four-jaw collet type (like a drill or Dremel chuck) that you cinch down with a small wrench (not included). It was very competitive in the weight rating, and it seemed well-balanced. The right hub is made of extremely thin, blue-anodized machined aluminum, and it's slotted to further decrease weight. If you replaced the steel wheel pins with nylon ones, this would be the test's lightest. The diff hub was very true, and when assembled with a stock axle, it saves about 0.15 ounce. CRC also makes corresponding 1/10-scale parts.



D) The hubs sold by Inside Line* are stock Associated pieces that have been further lightened, trued and balanced. Racers have used these hubs for years; they withstand accidents and abuse almost as well as their heavier stock counterparts. Used with a stock axle, they'll save you 0.19 ounce in 1/12 scale and 0.22 ounce in 1/10 scale, and the diff will be

smoother and more consistent.



F) Barracuda Racing* has taken weight reduction to the limit by incorporating Stealth diff

rings in their 1/10 and 1/12-scale Barracuda Lite hub and axle designs! The rings are easy to obtain and weigh half as much as standard rings, yet cost the same. You can use almost any brand of spur gear with them, and since the inside ball ring of the spur is used, you put only six or eight balls into it—less weight again! Finally, the diff faces on the axle and hub are smaller in diameter—less weight! The standard Barracuda parts (they use diff rings of a standard size) were almost as light as anything else in the test, saving 0.06 ounce over the stock 1/12-scale pieces, but the Barracuda Lite stuff was the lightest of the bunch. To give you an idea of how much difference there is between the red-anodized Lite parts and the competition, their 1/10-scale assembly

weighs almost the same as the second-lightest 1/12-scale manufacturer's assembly. Barracuda and Lite products meet strict standards for trueness (they're machined by the legendary Stevens & Son), but I think you lose a little smoothness with the small rings. The complete 1/12-scale Lite assembly (with included 4-40 titanium screws) will save you an unbelievable 0.23 ounce over stock parts. The 1/10-scale assembly weighs 0.33 ounce less than stock!

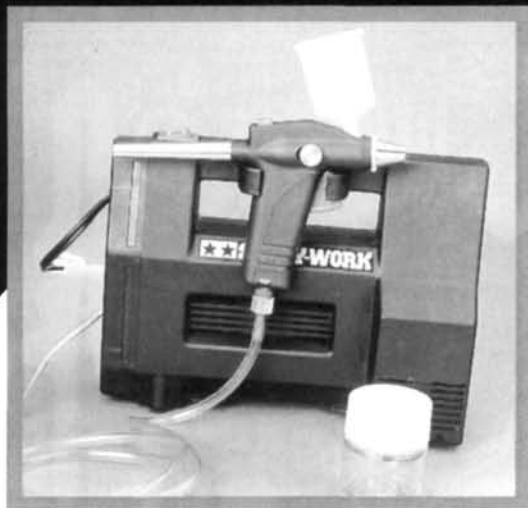
Weight a minute!

How much weight can you save by buying lightweight diff components? Some of the specialized hardware, such as the Barracuda Lite stuff, may not be fully compatible with parts from other sources.

Weight (in ounces)							
Manufacturer	Axle	10L (lh*)	10L (rh**)	Diff Rings	12L (lh*)	12L (rh**)	Hardware
Cuda Lite	0.46	0.21	0.19	0.05	0.12	0.09	Titanium screws (0.04)
Barracuda	0.47	—	—	—	0.17	0.11	Titanium axle (0.73)
IRS	0.48	—	0.21	0.14	—	0.17	—
NIFTECH	0.46	—	—	0.13	0.10	0.13	Light screws (0.07)
Inside Line	—	0.22	0.27	—	0.11	0.13	—
CRC	—	—	—	—	0.14	0.14	—
BRP	—	0.19	—	0.21	—	—	—
Associated	0.38	0.31	0.38	—	0.23	0.19	Light screws (0.04)

*left hub **right hub

Note that the Associated 10L axle that comes with your car is by far the lightest, but not the strongest. I'd be happy to show you my collection of "slightly bent" axles! On the other hand, look at how much of a weight penalty you pay by using a titanium axle. If that kind of strength is what you need, go for every other feather-weight part you can find!



TAMIYA SPRAY-WORK

Feeling artistic this Yuletide season? Then this Tamiya Spray-Work airbrush system is for you. It consists of a small portable compressor powered by an electric motor, a 7.2V Ni-Cd battery and an airbrush. The cool thing about having an airbrush is that you can mix paint and thin it to your requirements. You can also adjust the airbrush to spray wide areas or fine lines. Constant airflow keeps moisture from building up, and this keeps the paint from drying out and clogging the tip. List price: \$167.

Chris's Simple Christmas Solution

Simply make multiple photocopies of these pages, and mail them to those officious relatives who think they know what's best for you. Attach a note explaining that if they don't choose from this list, they'll be served nothing but last year's dried-out, moldy fruit cake for their entire stay (an excellent cure for cheapskate relations who overstay their welcome).



NOVAK ROOSTER

Hey, wouldn't it be really cool to get a new speed control in your stocking this year—yeah, it would, wouldn't it? This Novak Rooster would fit in there perfectly. Thanks to its unique one-touch setup button, you can be up and runnin' your car or truck almost as soon as you tear off the wrapping paper. The Rooster features forward and reverse, so get ready to "roost" in either direction. List price: \$129.

Christmas Wish



TRINITY EX-TECH MATCHED BATTERIES

It doesn't matter if you race off-road, on-road, stadium trucks, or Indy cars, you're going to need batteries. Everyone needs batteries! Tell your relatives that you want your stocking stuffed with Trinity's Sanyo 1700 SCRC performance-enhanced, Team Super cells—perfect for any racer. List price: \$89.99.



*'Twas the night before Christmas, when all through the night,
I dreamt my cheapskate relations for once gave the gifts that were right.
Don't give me pukey sweaters or cotton underwear,
Or any other lame crap I surely won't wear.
Give me cool tools and pushed cells,
And I'm in the spirit!, hearing Santa's sleigh bells.*

List

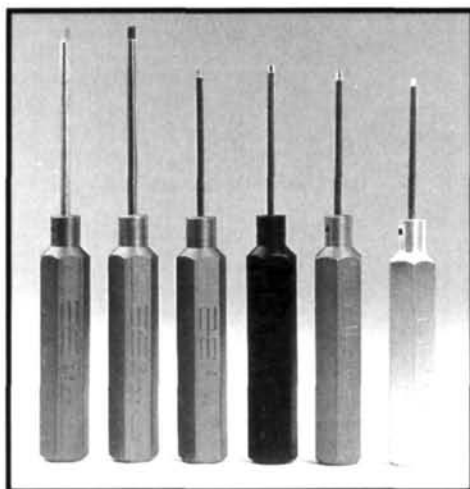
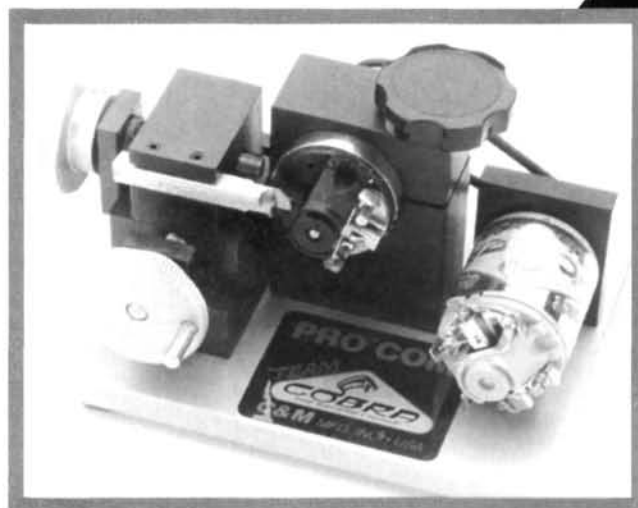


TAMIYA BASIC TOOL SET

Happy Yule; man, are these tools cool. This basic tool set from Tamiya is a very useful, inexpensive item that super-tightwad relatives can give you. The set includes two screwdrivers, a file, a razor knife, tweezers and side cutters. It's perfect for beginners. List price: \$26.

C&M TEAM COBRA STOCK COM 2000K

For the more experienced elf, how about C&M's commutator-cutting Cobra Pro Com with carbide cutting tip. When you true up the commutator with this lathe, you'll get better performance, longer run times, less heat and longer brush wear. List price: \$219.95.



ASSOCIATED'S DRIVERS

Maybe, if you've been good this year, Uncle Jim Bob and Aunt Tootie will get you a nice set of Allen drivers that come with a replaceable tip, like this one from Associated Electrics. Allen drivers are the perfect tool to replace those puny Allen wrenches that come in most kits, and they're much easier to use. The drivers come in .050, 1/16, 3/64, 1/32, and 1.5 to 2.5mm sizes. List price: \$7.50 each.

POCKET DRILL SET

If your uncle is a top contender for the title of "Cheapest Man in Town", the "Pocket Drill Set" (model PDS-12) is the perfect gift solution. This handy little tool drills holes in wood, plastic and soft metal. It clips to your pocket and holds 12 high-speed steel twist drill bits ranging in size from no. 74 (.014) to no. 52 (.062) in the aluminum body. \$9.95 (postpaid) Davis Model Products, P.O. Box 141, Dept. MN, Milford, CT 06460; (203) 877-1670.



Wish List



RAYTECH TEMP GUN

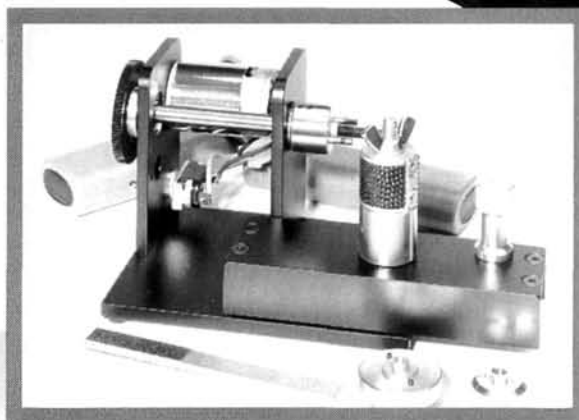
Now, when someone complains for the fiftieth time about how cold it is outside on Christmas morning, you can tell him what the exact temperature is! Actually, the Raytech ST2L is great to have if you run gas cars or trucks. It totally takes the guesswork out of tuning your engine. It's also a good tool to have if you want to check the temperature of your electric motor after a gear-

ing change. You can also use it to check your capped-tire temperature. The possibilities are endless as long as it's temperature-related. List price: \$200.



TEKIN BC 112A

Drop your eggnog, and check out this charger! The Tekin BC 112A DC charger features Power-Flex conditioning, which lowers cell resistance and, in turn, provides a noticeable power gain. It has three peak-charging modes, and its LCD panel displays volts, amps, charging time and capacity. The charger can charge from one to 12 cells. The BC 112A also comes in an AC/DC model known as the BC 112C. List prices: BC 112A—\$222; BC 112C—\$310.



MAXMOD TIRE TRUER

Hey, if you're getting serious about parking lot racing, you can save some money by mounting new foam on your old rims once you've worn out the stock ones. This DC-powered tire truer uses a Ni-Cd pack, and it has a slide assembly that operates smoothly. It also comes with all the accessories for $\frac{1}{10}$ - and $\frac{1}{12}$ -scale wheels. For those who have trouble jamming it into a standard stocking, get a bigger one. List price: \$165.



DREMEL MOTO-TOOL

Now here's an item I know everybody needs and wants: a high-speed Dremel rotary tool (with attachments, of course). Any relative who buys you Dremel's 3952 Variable Moto-Tool Super Kit with its top-of-the-line Moto-Tool, handy carrying case, 36-inch flex-shaft attachment and 32 of the most popular accessories/bits is definitely in line for "Most Favored Aunt/Uncle of the Year Award." List price: \$99.

UNGAR RACE STATION

If you ever intend to get into soldering, you should have a good soldering iron like this one from Ungar. This unit gets hot enough (it has a variable heat control from 400 degrees to 800 degrees) to do all kinds of soldering work on motors, batteries and just about any type of wiring setup. Santa looks highly on this unit because it comes with a sturdy base that includes a wire/ceramic iron holder and a cool sponge to wipe off any solder globber-spooge that gets on your iron. List price: \$139.95.



INDEX OF MANUFACTURERS

A&L Mfg., 505 N. Smith Ave. #105, Corona, CA 91718; (909) 735-5249.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342.

Aveox Inc., P.O. Box 1287, Agoura Hills, CA 91376-1287; (818) 597-8915.

Blue Thunder, distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-0022.

CRC, 6860 Stanwix Ave., Rome, NY 13440; phone and fax (315) 338-0867.

DA Graphite, 1235 Portola Ave., Spring Valley, CA 92077; (619) 562-6123.

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LETTERS (continued from page 8)

your articles on budget racing. We would also like to see some more cheap paint tricks. Thank you once again.

RANCE "SLICK" MARTIN,
JIMMY "JIMMY JAM"
DURHAM, "RED EYE"
CAMP, MICHAEL "THE
CHEAT" CHEATWOOD, "BIG
TODD" DALYRIMPLE,
"DIRTY" DAVE DANIELS
IDER, AL

Thanks for the praise, guys!
Here's some good news for
you: our February '95 issue will
feature a 2WD electric off-road
buggy shootout; check out our
March '95 issue for a special
"Motor Madness" section; and,
as for the painting tips, we'll

be bringing you lots more
throughout 1995—stay tuned!

KJ

BURNED OUT

First of all, I'd like to say that
your magazine is awesome. I
have one problem: I'd like to
obtain a new or used Turbo
Burns. I've called all the mail-
order companies in your maga-
zine, but nobody seems to have
one. So can you please give me
information on where or how to
get one? Is anyone out there
willing to sell one?

FRED SQUITIERI
75 Dann Dr., Stamford, CT
06905
(203) 329-0762

Fred, the car you want has
been discontinued for a few
years. Call hobby shops in your
area to see if anyone has a used
one for sale. You also might
want to check out the classified
ads in a local paper. If nothing
turns up, you might have to go
for the model that followed the
Turbo Burns—the Inferno. It's a
better car, anyway. John

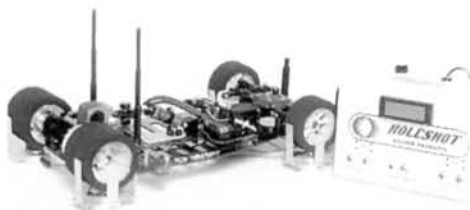
PACK RAT

I have a Kyosho Target/Scotch
Indy Car, and I want to buy a
7-cell battery for it. Do I need a
saddle pack or a hump pack?
Also, when is Team Losi going
to stop making new versions of
the LX-T?

KEVIN RYAN
Western Springs, IL

Kevin, as far as I can tell, a
7-cell battery pack won't fit in
the Target Indy Car. It was
designed to fit standard 7.2V
stick packs. You might be able
to add a separate cell, but the
performance gain wouldn't
justify the added weight of the
cell. If you want faster speeds,
either gear up a tooth or get a
faster motor. As for the LX-T
question, I'm pretty sure that
they've already stopped. With
Double-XTs hitting the hobby
shops now, any LX-T kits you
see have been around for a
while. John

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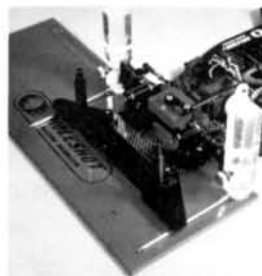
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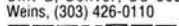
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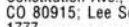
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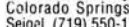
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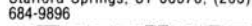


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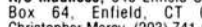
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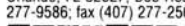
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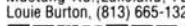
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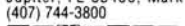
Lake Whippoorwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (407) 277-2568



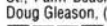
Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322



My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800



PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33410; Doug Gleason, (407) 743-9791



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Red's R/C Raceway & Hobbies, Etc. 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330



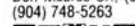
River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



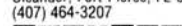
Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143



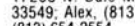
Three Flags R/C Racetrack, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870, fax (904) 748-5263



Treasure Coast R/C Club, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207



West Coast R/C Club, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554



GEORGIA

Chafee Park Raceway, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929



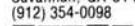
Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



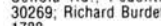
Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline (912) 788-8731



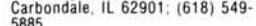
Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



PDO Raceway & Hobbies, 341 Senoia Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788



Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Track Directory

Race Slot and Wing Hobbies "Race Place", 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920

Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073

INDIANA

Autograph/Race World, 231 Pendleton Ave., Pendleton, IN 46064; Sam Mudd, (317) 778-3386

Blaze'n Race'n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 867-1324

Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163

Hobby Barn Raceway, 1950 Springfield, Terre Haute, IN 47802-9694; (812) 299-5773

K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353

Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060

Main Hobbies, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045

P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, fax (812) 332-0018

R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464

Racer's Choice Raceway, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250; Eric Burns, (812) 866-5521

Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288/shop, 987-2803/home

The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

IOWA

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736

M&M Racetrack, 2434 Pilgrim Path, Oskaloosa, IA 52577; (515) 673-6265

Radio Control Raceway Park, 746 South 30th St., Fort Dodge, IA 50501; Bernie Halverson, (515) 578-3780

Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Allen Reck, (712) 754-2604

Southwest Iowa Hobbies 'n' R/C Raceway, 204 S. Broadway, Red Oak, IA 51566; Debbie Johnson, (712) 623-5513

KANSAS

M&M R/C Superspeedway, 2400 Broadway, Parsons, KS 67357; Mark Brown, (316) 421-6742

R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313

RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

S&K Hobby Shop, 1313 S.W. 21st St., Topeka, KS 66604; Joe Knernschield, (913) 357-0104

Shawnee Hobby & R/C Raceway, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Pugh, (913) 384-3211

R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464

KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE

Checkerboard Flag Raceway, 1790 Bryan Station Rd., Lexington, KY 40505; Billy or Jay, (606) 293-6825

ProTrak R/C Racing, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin, (502) 778-2657

West Kentucky R/C Hobbies, 45 Hawkins Loop, P.O. Box 21, Symsonia, KY 42082; (502) 851-3534

LOUISIANA

Cajun R/C Raceway, Rt. 2, Box 288 (Hwy. 343, Bosco) Church Point, LA 70525; Ray Thibodeaux, (318) 873-3855

Red Dirt Raceway & Hobbies, 324 Pitkin Rd., Leesville, LA 71446; C.J. Hall, (318) 535-9238

T&M Pro Hobbies, 9212 W. Judge Perez Dr., Chalmette, LA 70043; Tom/Melodie Barthel, (504) 271-3111

MAINE

Central Maine R/C Speedway and Hobbies, 18 Lithgow St., Winslow, ME, 04901; David Prescott, (207) 877-2232

Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003

Mementos Hobby Shop, 86 Sweden St., Caribou, ME 04736; (207) 498-3711

MARYLAND

The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630

Wolfland Hobbies and Raceway, 2072 Crain Hwy., Waldorf, MD 20601; Perry Pritchard, (301) 870-0293

Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244

Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373

North East Auto Racers, 4 Graf Rd., Newburyport, MA 01882; Dave Thibault, (508) 699-9587

R/C Hobbies & Speedway, 16 Rio Way, Fairhaven, MA 02719; Toni or Roy, (508) 991-5040

Can-Am Hobbies Speedway Park, 1152 Gratiot, Marysville, MI 48040; Don Grinde, (313) 364-3338

Chatter Box Racing, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829

Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368

JJ's R/C Speedshop, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420, fax (810) 977-7290

Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654

Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (517) 773-5711

Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; (517) 773-5711

R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686, fax (616) 329-1744

Scale Racing Center, 3700% Elizabeth Lake Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529

T/A Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217

Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374

Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Oriikowski, (616) 791-9902. (Open May through August.)

C/S Speedway, 312 N. Bdwy, Crookston, MN 56716; Caesar Kaiser, (218) 281-6665

Greater Minnesota Racin' Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768

Larry's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246

Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365

Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749

Range Racing World R/C Speedway, 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423

Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Ofelie, (612) 644-3424

Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

Crossroads Raceway, 904 Cass St., Corinth, MS 38838; Ronnie Inman, (601) 287-7169

Fast Freddy's Raceway, 20390 Hwy. 49, Sautier, MS 39574; Mark Payne, (601) 832-0315

Joe McFaden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFaden, (601) 483-7000

Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Boonville, Springfield, MO 65802; Juan Montell, (417) 725-4337

Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828

NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414

NEVADA

Radio Controlled Race World, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882

R/C Fever, 3580 Polaris, Suite 2, Las Vegas, NV 89103; Jim or Darin, (702) 367-RACE

Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577

Economy R/C Racing, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482

Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393

Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549

Lake Region R/C Speedway, Lily Pond Rd., Laconia, NH 03246; Louie Blais, (603) 524-2909

Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193

American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Larry Wedemeyer, (908) 446-2010

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

Spennell Speedway, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828

ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Boonville, Springfield, MO 65802; Juan Montell, (417) 725-4337

Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912

NEW MEXICO

Las Cruces R/C, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962



NEW YORK

A&D's FastTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065



Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616



Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224



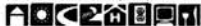
Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194



Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859



Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140



Competition Hobby Supplies, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 786-3622



East Coast Barn Stormers, MD #1 Old Oxford Rd., Chester, NY 10918; Michael or Lou, (914) 469-5883



East End Off-Roaders, 7335 Main Rd., Mattituck, NY 11952; Wally, (516) 298-2020



Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940



LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



1/10 Raceway and Hobbies, 168 Broad Hollow, Farmingdale, NY 11735; George or Dora, (516) 845-7223



Performance Hobbies Raceway, 205 North Ave., Webster, NY 14580; Anthony Cenzi, (716) 621-1274



Peter's R/C Raceway, Rte. 36, Leicester, NY 14481; P. Gerald Scorsone, (716) 382-3126



R/C Competition Corner, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718



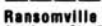
R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536



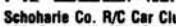
R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722



Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456



Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Small Torque Racers of Long Island, 24 Horton Dr., Huntington Station, NY 11746; George Franz, (516) 271-1119



South Shore Hobby & Raceway W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368



Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664



Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



NORTH CAROLINA
Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407



C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482



C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321



Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (919) 762-1184



Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569



Carolina Hobbies R/C Raceway, Route 1, Box 158, Taylorsville, NC 28681; Kim & Roseanne Kulawik, (704) 495-4040



Clapp's R/C Motor Speedway, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-3198



Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbitt Marshburn, (919) 592-9489



Hobbies, Etc., 5540 Atlantic Springs, Raleigh, NC 27604; Don Asplen, (919) 790-1444



Hobby Park, W. Clemmons Rd., Winston-Salem, NC 27103; Dick Butler, Parks & Recreation, (919) 727-2063



Motorlead R/C Raceway, 125 Park St., Canton, NC 28716; (704) 648-7911



Ride & Slide R/C Raceway, 5319 Yadkin Rd., Fayetteville, NC 28303; Jim Woodman, (910) 425-5276 or Bill Culbertson, (910) 867-4202



Rosewood Speedway, Rt. 5, Box 853, Goldsboro, NC 27530; Glenn Elam, (919) 731-4734



S&B Speedway & Hobbies, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422



Sandhills Raceway Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Hobby Park Dragway, W. Clemmons Rd., Winston-Salem, NC; Jack Wright, (919) 983-9416



NORTH DAKOTA
Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscher, (701) 839-4419



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PRO-LINE

PRO-LINE CONTINUED TO DOMINATE IN 1994!

Pro-Line tires continued to roll over the competition in 1994, proving to the world that to win races, you must run the best tires available. Team Associated's Mark Pavidis reached for **Pro-Line's** new XTR front truck tires—"THE EDGE" combined Pro-90 mini-

pins—to out-qualify the field by 6 seconds at the ROAR Nationals. "The Edge combination was on fire as it was used by six other drivers to reach the A-Main at the Nationals."



Pro-95 "The Edge"
(Stock no. 8095)

Locally, at Outlaw Hobbies, **Pro-Line's** XTR Compound ran for 4 hours straight to win the Southern California Truck Endurance Challenge. The team reached for a set of Pro-65 fronts and Pro-96 Stubbie "T" rear truck tires for their stock Associated RC10T. Team manager Larry Sporrang stated that, "The tires actually gained traction as the race progressed." The XTR Compound not only held up for the whole race, but, at the end, also showed minimal wear to the tread. Team drivers Matt Bryer and Tom Hodgkin say "XTR was hooked up the whole race." They were thoroughly impressed!

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- '94 Winter Championships Modified 2WD and 4WD truck champion: total domination!
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- '94 Reedy International Off-Road 2WD and 4WD champion
- '94 Cactus Classic 2WD and 4WD Stock champion
- '94 European Modified 2WD and 4WD champion
- '94 NORRCA Gas Truck Nationals champion
- '94 Mid-Atlantic Gas Challenge truck champion
- '94 West Coast Gas Challenge truck champion
- '94 Reedy Race of Champions 4WD champion
- '94 ROAR Region 12 Modified 2WD and 4WD champion
- '94 ROAR Region 4 Modified 2WD, 4WD and truck champion
- '94 Endless Summer Classic Modified truck champion

New XTR part numbers

8090 Pro-90 XTR new, improved mini-pin 2.2" truck tire
8092 Pro-92 XTR new, improved Fuzzie "T" 2.2" truck tire
8095 Pro-95 XTR "The Edge" front 2.2" truck tire
8096 Pro-96 XTR Stubbie "T" 2.2" truck tire
8115 Pro-115 XTR Quatro front 2.1" 2WD tire

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Track Directory

Northern Mini Racers, 2105 North Broadway, Minot, ND 58701; Patrick McWethy, (701) 839-8868



OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300



C/R Hobbies/Top Race Track, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



D&J R/C Raceway, 801 W. Market St., Orville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266



D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112



Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589



Hobby Mania Raceway, 6597 Route 224, Lowellville, OH 44436; (216) 536-8282



Innovative Hobbies/Lakeside Speedway, 3427 Manchester Rd., Akron, OH 44319; (216) 645-1333



JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222



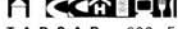
Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422



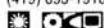
Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818



Lewisburg R/C Raceway, 395 US Rt. 40E, Lewisburg, OH 45338; Gene Butler, (513) 678-9201



T.A.R.C.A.R., 632 Eckle Rd., Perrysburg, OH 43551; Bill Bridges, (419) 826-3859 or Dave Scanes, (419) 893-1916



Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025



OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416



Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Derald Seabolt, (918) 486-3948



Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528



OREGON

Cathie's R.C. World, 443 So. Calapooia, Sutherlin, OR 97479; Wes/Cathie Buzzard, (503) 459-2746



Competition Racing Assoc., 17941 NE Glisan, Portland, OR 97230; Mark Taylor, (503) 257-0796



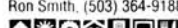
Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090



North Lawrence Raceway, 36 N. Lawrence, Eugene, OR 97401; Gary Hill, (503) 484-9857



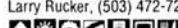
R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234



PENNSYLVANIA

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Boze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045



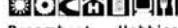
Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



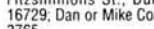
Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585



Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (215) 269-1300



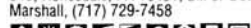
Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



Mt. Laurel Speedway, 835-8 Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



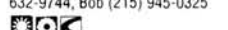
The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850



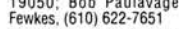
Pinion Twisters, 3M Plant, Green Ln and Mitchell, Bristol, PA; John (215) 632-9744, Bob (215) 945-0325



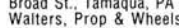
Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651



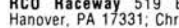
Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



RCD Raceway, 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



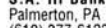
Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



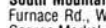
S.A. Hi Banks, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123



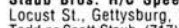
South Mountain R/C Speedway, 357 Furnace Rd., Wernersville, PA 19565; George Merkel, (215) 267-4736



Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



TC's R/C's, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coniale, (412) 226-8802



Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877



PUERTO RICO

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083



RHODE ISLAND

Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908



SOUTH CAROLINA

Bandit's Performance R/C Hobbies, 2037 S. Main St., Darlington, SC 29532; Bryan Howie Jr., (803) 393-3333



Coastal R/C Speedway, 8553 Hwy. 544, Myrtle Beach, SC 29577; Wendel Smith, (803) 236-9309



R/C Speed Shop & Raceway, 2122 Platt Springs Rd., W. Columbia, SC 29169; Eric Prevost, (803) 791-4715



SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

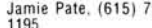


TENNESSEE

Action Hobby Shop, 3723 S. Mendenhall, Memphis, TN 38115; Brian Stricklin or Justin Austein, (901) 365-2620



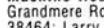
Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 30715; Jamie Pate, (615) 792-4371, ext. 1195



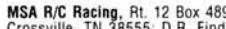
D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919



Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630



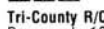
MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027



Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423



Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwayne Romine, Kyle Romine, (615) 376-2330, 376-9955



TEXAS

Austin R/C Center, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144



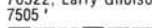
Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Heinz Falke, (713) 399-1527



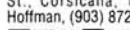
Hal's Hobby Raceway, 1440 Bessmer, El Paso, TX 79936; (915) 591-2213



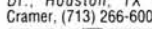
Heart o' Texas Hobbies & Raceway, 309 W. Hwy. 190, Coppas Cove, TX 75622; Larry Gholson, (817) 547-7655



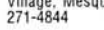
Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761



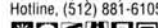
Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006



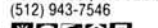
Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844



Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105



Star Hobbies, 1200 Hwy. 100, Box 5, Port Isabel, TX 78578; Fred Carr, (512) 943-7546



T&T Eagle

Track Directory

NORA Performance R/C, P.O. Box 955 (1673 Cedarvale Rd.), Mt. Vernon, WA 98273; (206) 755-9464



Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



S&N's Tracksides Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910



Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838



Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE



Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Nell Bade, (206) 565-1935



Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659



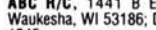
Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487



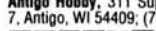
Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355



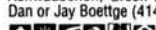
ABC R/C, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245



Antigo Hobby, 311 Superior St., Suite 7, Antigo, WI 54409; (715) 623-7655



Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge (414) 339-8288



JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096



R/C Hobby Off-Road Track, Lewison Lane, Viroqua, WI 54665; Dan and Diane Sawvell, (608) 637-8221



Action Weelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756



ATN, Auto Teleguide Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097



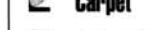
Circuit Pepsi, Centre de Location, 37 du Roi, Sorel, Quebec; (514) 746-8828



Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch De L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554



Club RCSI, 44 Rue Holiday, Sept-Îles, Quebec G4R; Sylvio Gerard (418) 968-6575, hobby shop (418) 962-6565



CRCCC, Box 309, Clinton, Ontario N0M 1L0; Eric Russell (519) 482-9429



Holstebro R/C Buggy Club, Mozartvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734



Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691



Rainbow Raceway, Eriksvej 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504

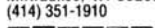


Thor Minirace Odense, Sohusevej 255, Allesø, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707

East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262



Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084



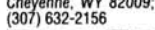
Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



Hobbypro Raceways Ltd., 16020-132 Ave., Edmonton, Alberta T5V-1M1; Tony or Ian, (403) 455-RACE (7223)



Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530



Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhuizen, (604) 374-1268, (604) 374-8458



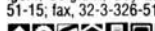
J-T International Raceway, 127 Milligan Lane, Nanaimo, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



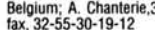
MORRAC Raceway, 6449 Crowchild Tr. SW., Box 36060, Calgary, Alberta T3C 7C8; (403) 254-1386



Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035



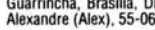
Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax: (613) 962-7306



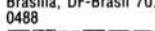
Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateaufort, Quebec J6K 3B4; (514) 698-2151



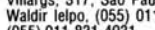
South Okanagan Roadhogs, Skha Lake Rd., Penitence, BC, Willie Lemm, (604) 492-5698



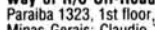
Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855



Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361



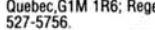
Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892



Holstebro R/C Buggy Club, Mozartvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734



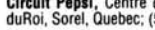
Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691



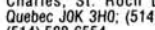
Rainbow Raceway, Eriksvej 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504



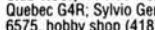
Thor Minirace Odense, Sohusevej 255, Allesø, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707



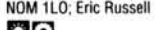
Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

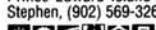


Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662

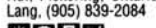


Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506

Yokata R/C Racers, Yokata Air Base, Tokyo Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942



Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478



Alices Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729



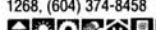
Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430



Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28



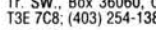
Hobby's Formula, Au observatorio 457 DF 01120; (905) 502-3620



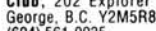
Hobby Model's Raceway, Blvd. Garcia de Leon, 1555, Morelia, Michoacan 58260; (431) 5-01-22



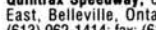
Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94



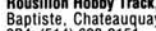
La Huelera, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabell, (42) 12-15-25



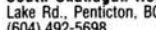
Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhat, (73) 19-12-38



R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47



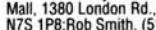
Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141



Nahshoneat, Abba Nile Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252



Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romildo, 015-405881, fax 015-922709



Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662



Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506



Yokata R/C Racers, Yokata Air Base, Tokyo Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942



Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478



Counties R/C Raceway, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09 23 86904



Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711



Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Prive, Auckland; Chris, (09) 838-5201

ENGLAND

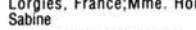
Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657



Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763



Lorgies Bolides, rue Beau-Riuz, 62840 Lorgies, France; Mme. Hourdequin Sabine



MC Köln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493



Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609



Oberhausen-Altstadt, Am Fserderturm, Oberhausen, Germany 46099; Josef Holl, 0208-403676



Stoppelhopper, Oberhausen, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545



Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061



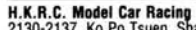
H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822



Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828



everly's Racing, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Mudik, 011-62-31-595-888



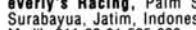
Nahshoneat, Abba Nile Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252



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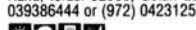
Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



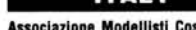
Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662



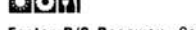
Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506



Yokata R/C Racers, Yokata Air Base, Tokyo Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942



Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478



Alices Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729



Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430



Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28

Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP

Track Directory

NORWAY

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95



PHILIPPINES

Boyet R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Mayamot, Antipolo, Rizal; Jose "Boy" Chua, 721-2555



Philippine R/C Association, 8 F. Homes Paranaque, Metro Manila 1700; Ronald/Manny Villaflo, 23-30-08



SOUTH AFRICA

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865



SPAIN

Club Social Sevillana, Crta. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282



Motoclub Castellon R.C., Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411



Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298



ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 011-34-56-822652



CRAEM, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952



SWITZERLAND

E.M.B.C.M. Raceway, Main Street, opposite police station, 8854 Siebnen, Switzerland; Markus Schmid, 01-9233621



JMRCV-Terraindu Levant, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax, 19 41 22 7790805



VENEZUELA

Las Fuentes R/C Club, 2da Calle las Fuentes El Paraíso, Caracas, DF 1020, Franco Agrusa, (02) 461-72 55



R/C Mariche, KM4 Zona Industrial Del Este Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993



Robin R/C Racing Club, Avenida Bolívar CC Luz #1, Valencia, Edo., Carabobo; Fernando León, (041) 223997 or 222386



WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill, St. Andrew, Jamaica, West Indies; Rodney Littau, (809) 926-7034 or 927-1198



ZIMBABWE

Mosi-Oa-Tunya, H9619 Highland Harare, Harare Country, Masioraland, Zimbabwe; 46237



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- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

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| <input type="checkbox"/> Outdoor | <input type="checkbox"/> AC power |
| <input type="checkbox"/> Off-road | <input type="checkbox"/> Automatic lap-counting |
| <input type="checkbox"/> Oval | <input type="checkbox"/> Food available |
| <input type="checkbox"/> Banked | <input type="checkbox"/> Wheelchair-accessible |
| <input type="checkbox"/> Dirt | |
| <input type="checkbox"/> Carpet | |
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CHRIS'S

BACK LOT

This is my page—MINE!

PARKING ANY TIME



The Lot Lives

I've made it my personal quest to take R/C racing from the sponsored racer and give it back—yes back!—to the grassroots racer. Just call me "Robin of the Hood." No, forget that; he wore tights. Seriously though, the "parking lot" thing does have the potential to become a coast-to-coast phenomenon. If you don't believe me, here's recent communication and information that offers proof and inspiration.

Don't be shy now; send in those pictures. Some of

you have sent news clippings, which is great, but I can't use them unless you can also send the original (or similar) photo. We can't reproduce an image from crummy newsprint. Don't forget the pretty women!

PARKING LOT USA

I wanted to drop you a line to let you know about an outstanding R/C racing program that's sponsored by one of our franchise stores. In case you aren't familiar with Hobby Town USA, we're a national franchiser of hobby stores. We have locations in 35 states, and we should be surpassing the 100-store mark in the next two months! Our stores carry complete lines of R/C car and truck products, both in ready-to-run and kit form.

As a natural sideline to the retail stores, many Hobby Town USA stores also feature R/C racing programs, either on dirt tracks or on parking lots. Dennis and Janet Crippen are store owners in the Phoenix-Scottsdale metropolitan area. They currently operate two Hobby Town USA stores, with a third one due to open this spring. Their R/C racing program is one of the best I have ever come across in my 25 years in the hobby industry.

The Crippens hold races four times a week and routinely get over 50 racers per outing. Their approach to racing has been to make it a family entertainment venue, and there are often fathers, sons, mothers and daughters racing together!

The following is a letter received from Merlin Hayes, the president of Hobby Town USA, in which he talks about the growing success of their parking lot program.

They've received coverage in Phoenix newspapers, but we felt that exposure of this type of racing program could provide ideas to other hobby stores around the country.

If you're interested in talking further to the Crippens regarding their outstanding program, you may want to contact them at the Gilbert, Arizona store address: Dennis and Janet Crippen, Smitty's Township Plaza, 1915 E. Baseline Rd., Gilbert, AZ 85234; (602) 892-0405.

I hope you find their racing program to be as exciting as I do! Theirs can serve as a model for others to follow! If you have any questions, please feel free to contact me or James Hogg, our vice president of Franchise Services.

Merlin P. Hayes, President

THE LEGEND Lives

From: Brad2dbone@aol.com (8/25/94)
To: chrisc@airage.com



Mail*Link® SMTP

Parking lot fanatic

We just ran our first impromptu Legends car race last night. What a blast!

These cars are great! I was so impressed by their performance, that I'm ditching my 10L for on-road and running a Legend car class. I put it together last night, and this weekend I'll paint it and get it ready to go for next week. We are running our Legends cars with six cell packs, because everyone has them.

Our club is going strong and getting more members weekly. We run under the parking lot lights of a local strip mall. One of the local movie theatres is even giving tickets away for us to distribute amongst our racers. We always make sure that we leave the lot in better shape than when we arrived. We're in the process of writing up all the bylaws and getting all the necessary legalities taken care of to make the club an official non-profit organization.

This is an unedited letter from Brad (a reader) that came to me via Internet. If your computer is online, give me (or Brad, for that matter) a "call."

The opinions expressed on this page do not necessarily represent the opinions of the entire Car Action staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, 251 Danbury Rd., Wilton, CT 06897.